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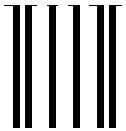

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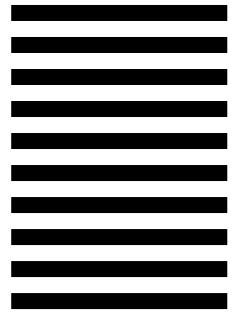

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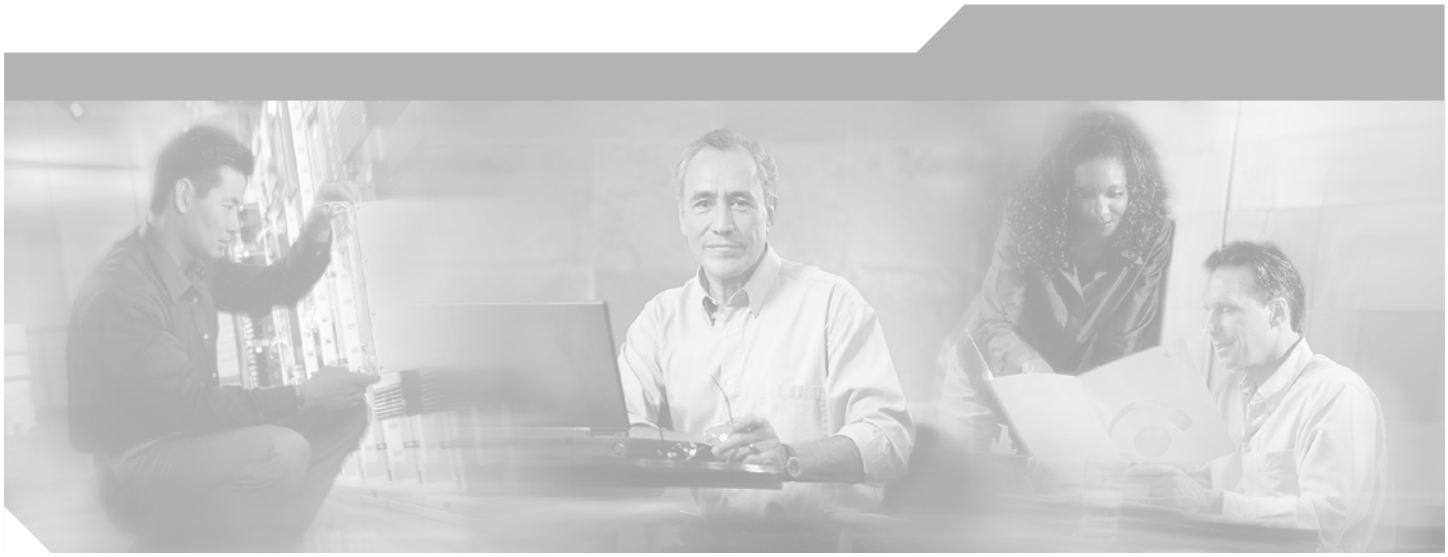

Cisco SN 5428-2 Storage Router Software Configuration Guide

Release 3.3

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

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About This Guide

This preface describes the objectives, audience, organization and command syntax conventions of the *Cisco SN 5428-2 Storage Router Software Configuration Guide*. It also provides information on how to obtain related documentation and technical assistance.

Note The model number of the SN 5428-2 Storage Router may appear on your terminal as 5428-2-K9 during console sessions with the storage router and in command line interface (CLI) output.

Objectives

This software configuration guide describes how to configure software in a Cisco SN 5428-2 Storage Router. It does not describe every possible configuration but does describe those tasks commonly required to configure the software.

Note This guide does not describe how to configure the iSCSI driver to be installed in each host requiring IP access to storage. Download the Cisco iSCSI drivers from Cisco.com and install and configure the drivers according to the accompanying readme files, release notes, and example configuration files.

Audience

This guide is intended primarily for the following audiences:

- System administrators who are familiar with the fundamentals of router-based internetworking and network storage devices, but who might not be familiar with the specifics of Cisco products or the routing protocols supported by Cisco products.
- System administrators who are responsible for configuring network storage equipment.

Organization

This guide contains the following chapters (Table 1):

Table 1 Document Organization

Chapter	Title	Description
Chapter 1	Before Configuring SN 5428-2 Storage Router Software	Describes what you should understand prior to configuring storage router software.
Chapter 2	First-Time Configuration	Describes what configuration information to gather and explains the initial system configuration script and setup configuration wizard. This chapter also introduces the CLI and web-based GUI.
Chapter 3	Configuring System Parameters	Provides procedures for configuring system parameters.
Chapter 4	Configuring for VLAN	Provides procedures for configuring VLAN.
Chapter 5	Configuring Fibre Channel Interfaces	Provides procedures for configuring Fibre Channel (FC) interfaces and FC fabric zoning.
Chapter 6	Configuring SCSI Routing	Provides procedures for configuring SCSI routing.
Chapter 7	Configuring Transparent SCSI Routing	Provides procedures for configuring transparent SCSI routing.
Chapter 8	Configuring FCIP	Provides procedures for configuring FCIP.
Chapter 9	Configuring Authentication	Provides procedures for configuring AAA authentication and enabling iSCSI, Enable and Login authentication.
Chapter 10	Configuring a High Availability Cluster	Provides procedures for configuring a storage router cluster.
Chapter 11	Maintaining and Managing the SN 5428-2 Storage Router	Describes how to perform normal maintenance and management tasks associated with the storage router.
Chapter 12	Command Line Interface Reference	Provides information on the command line interface (CLI) and on all CLI commands.

Command Syntax Conventions

Table 2 describes the syntax used with the commands in this document.

Table 2 Syntax Conventions

Convention	Description
boldface font	Indicates commands and keywords that you enter literally as shown.
italic font	Indicates arguments for which you supply values.
[x]	Square brackets indicate an optional element (keyword or argument).
{ x }	Braces indicate a required element (keyword or argument).
{s | y | z}	Braces and vertical bars indicate a required choice of keywords or arguments, separated by the vertical bars within the braces.
[x {y | z}]	Braces and vertical bars within square brackets indicate a required choice within an optional element.
/bits	The value entered for */bits* specifies a network mask in classless interdomain routing (CIDR) style. That is, the value equals the number of bits in a network mask counting from the most significant side (left) of an IP address. For example, a */bits* value of 24 is the equivalent of a network mask of 255.255.255.0. Similarly, a */bits* value of 32 specifies using the entire IP address.
"user text"	Indicates that user text (a user-defined text string) that contains a space or spaces must be enclosed using double or single quotes. If single quotes or an apostrophe is used as part of the text string, enclose the string using double quotes. If double quotes are used as part of the text string, enclose the string using single quotes. For example, both "Pat's storage router" and 'number "2"' are valid text string entries. **Note** The question mark (?) character cannot be used as part of a text string.
`screen font`	Examples of information displayed on the screen.
boldface screen font	Examples of information you must enter.
< >	Nonprinting characters, for example, passwords appear in angle brackets.
[ ]	Default responses to system prompts appear in square brackets.

Note Means *reader take note*. Notes contain helpful suggestions or references to additional information and material.

Caution Means *reader be careful.* In this situation, you might do something that could result in equipment damage or loss of data.

Timesaver Means *the described action saves time*. You can save time by performing the action described in the paragraph.

Related Documentation

Refer to the following documents for additional information:

- *Cisco SN 5428-2 Storage Router Hardware Installation Guide*
- *Release Notes for the Cisco SN 5428-2 Storage Router*

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation on the World Wide Web at this URL:

http://www.cisco.com/univercd/home/home.htm

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http://www.cisco.com

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Obtaining Technical Assistance

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Cisco.com

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- Download and test software packages
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To obtain customized information and service, you can self-register on Cisco.com at this URL:

http://tools.cisco.com/RPF/register/register.do

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The type of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration. There is little or no impact to your business operations.
- Priority level 3 (P3)—Operational performance of the network is impaired, but most business operations remain functional. You and Cisco are willing to commit resources during normal business hours to restore service to satisfactory levels.
- Priority level 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively impacted by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.
- Priority level 1 (P1)—An existing network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Cisco TAC Website

The Cisco TAC website provides online documents and tools to help troubleshoot and resolve technical issues with Cisco products and technologies. To access the Cisco TAC website, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

http://tools.cisco.com/RPF/register/register.do

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, we recommend that you open P3 and P4 cases online so that you can fully describe the situation and attach any necessary files.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

  http://www.cisco.com/en/US/products/products_catalog_links_launch.html

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary, Internetworking Technology Handbook, Internetworking Troubleshooting Guide,* and the *Internetworking Design Guide.* For current Cisco Press titles and other information, go to Cisco Press online at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips, configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access *Packet* magazine at this URL:

  http://www.cisco.com/go/packet

- iQ Magazine is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:

  http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html

Before Configuring SN 5428-2 Storage Router Software

The Cisco SN 5428-2 Storage Router installation and configuration tasks consist of the following:

- Install the SN 5428-2 Storage Router according to the *Cisco SN 5428-2 Storage Router Hardware Installation Guide*.
- Select how the SN 5428-2 will be deployed: SCSI routing, transparent SCSI routing, or FCIP.
- Configure the SN 5428-2 Storage Router software according to the *Cisco SN 5428-2 Storage Router Software Configuration Guide* (this manual).
- Install and configure iSCSI drivers in IP hosts connected to the storage router.

  The iSCSI driver is not required for FCIP deployment, or in IP hosts that have a TCP/IP Offload Engine (TOE) with embedded iSCSI protocol installed.

This chapter is the starting point for SN 5428-2 Storage Router software configuration. It provides some very basic, abbreviated information as background to help you understand the SN 5428-2 Storage Router features and the software configuration process. It contains the following topics:

- SN 5428-2 Storage Router Software Overview, page 1-2
- SCSI Routing Overview, page 1-4
- Transparent SCSI Routing Overview, page 1-10
- FCIP Overview, page 1-15
- VLAN Access Overview, page 1-18
- Zoning Overview, page 1-19
- Fibre Channel Interface Overview, page 1-21
- Gigabit Ethernet Interface Overview, page 1-21
- Authentication Overview, page 1-22
- SN 5428-2 Cluster Management Overview, page 1-22
- Interface Naming, page 1-23
- Where to Go Next, page 1-24

SN 5428-2 Storage Router Software Overview

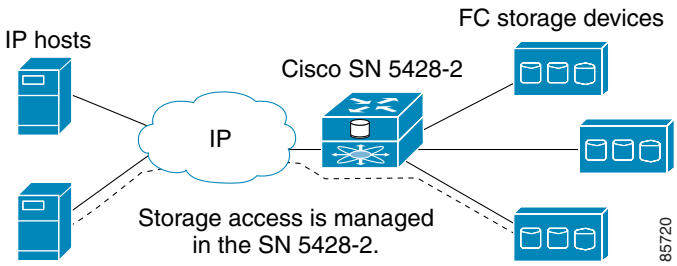
The Cisco SN 5428-2 Storage Router provides universal access to storage over IP networks. The storage router software controls the operation of the Cisco SN 5428-2 Storage Router. You can configure the software to provide the following types of access to storage over IP networks: SCSI routing, transparent SCSI routing, or FCIP.

SCSI routing provides IP hosts with access to Fibre Channel (FC) storage devices, using iSCSI protocol. The iSCSI protocol is an IETF-defined protocol for IP storage (ips).

Note For more information about the iSCSI protocol, refer to the IETF standards for IP storage at http://www.ietf.org.

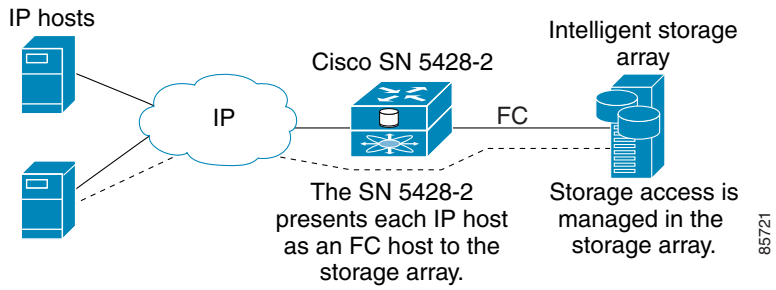
With SCSI routing, storage device access is managed primarily in the SN 5428-2. (See Figure 1-1.)

Figure 1-1 SCSI Routing



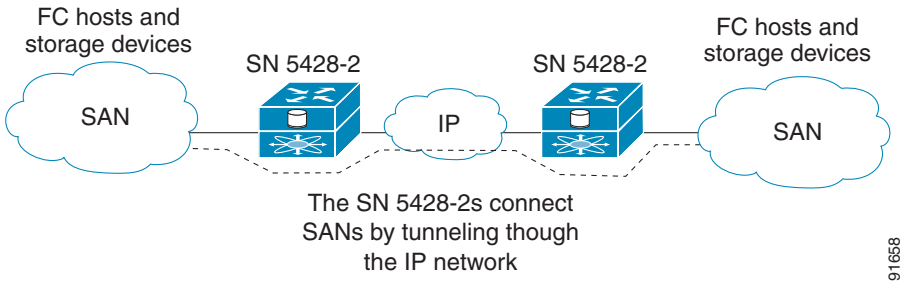
Transparent SCSI routing provides IP hosts with transparent access to intelligent storage arrays using iSCSI protocol; that is, each IP host is presented as an FC host to an intelligent storage array. With transparent SCSI routing, availability of storage devices is managed primarily in the intelligent storage array. (See Figure 1-2.)

Figure 1-2 Transparent SCSI Routing



Fibre Channel over IP (FCIP) enables SN 5428-2 Storage Routers to provide connectivity by tunneling through an IP network between storage area networks (SANs). (See Figure 1-3.)

Figure 1-3 FCIP



In addition to providing services for accessing storage over IP networks, the SN 5428-2 Storage Router software provides the following services:

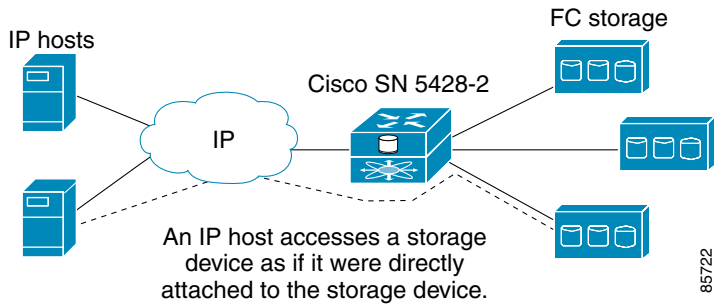
- VLAN Access Control—provides IP access control to storage based on a VLAN identifier (VID) number (in addition to access control through access lists)
- Authentication—provides iSCSI, Enable and Login authentication using AAA authentication methods
- High Availability (HA)—provides the ability to group storage routers in a cluster for intelligent failover and other cluster-related functions (for SCSI routing only)
- E_Port with FC Fabric Zoning—provides the ability to connect FC ports to FC switches and participate in fabric zoning, manage zoning, and support zone mergers
- SNMP/MIB support—provides network management of the SN 5428-2 through SNMP using selected MIBs
- Gigabit Ethernet Interface features—provides the ability to assign a management IP address per Gigabit Ethernet interface, multiple IP addresses per SCSI routing instance, and an optional secondary Gigabit Ethernet interface per IP address used for SCSI routing or SN 5428-2 management. When the SN 5428-2 is deployed for FCIP, provides primary and optional secondary Gigabit Ethernet interfaces to the FCIP peer.
- Buffer credit extension—enables the SN 5428-2 to donate buffer credits from a donor port to selected FC ports
- Secure Sockets Layer support—provides HTTPS connection for secure access through the web-based GUI
- Secure Shell (SSH) protocol version 2 support—provides high encryption and authentication for interactive management sessions, and is a common replacement for Telnet
- Routing Information Protocol (RIP) listening support—allows the SN 5428-2 to learn dynamic routing using RIP (version 1 or version 2) listening
- Service Location Protocol (SLP) Support—provides the ability to advertise targets of specified SCSI routing instances
- TCP Window Tuning—provides the ability to maximize bandwidth across the network by automatically setting the local TCP receive window size to the remote TCP receive window size without user intervention
- A command-line interface (CLI) and a web-based GUI—provides user interfaces for configuration and maintenance of an SN 5428-2

Note The web-based GUI is not available in SN 5428-2s deployed for transparent SCSI routing.

SCSI Routing Overview

SCSI routing provides IP hosts with access to FC storage devices as if the storage devices were directly attached to the hosts, with access to devices being managed primarily in the SN 5428-2 Storage Router. An iSCSI target is an arbitrary name for a group of physical storage devices. The iSCSI targets are created and mapped to physical storage devices attached to the SN 5428-2. The storage router presents the iSCSI targets to IP hosts as if the physical storage devices were directly attached to the hosts. (See Figure 1-4.) With SCSI routing, storage devices are not aware of each IP host; the storage devices are aware of the SN 5428-2 and respond to it as if it were one FC host.

Figure 1-4 SCSI Routing Overview


IP hosts
FC storage
Cisco SN 5428-2
IP
An IP host accesses a storage device as if it were directly attached to the storage device.
85722

To configure an SN 5428-2 Storage Router for SCSI routing, you should have a basic understanding of the following concepts:

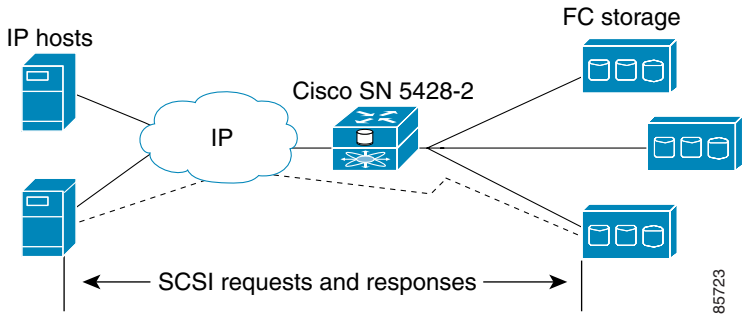
- Using iSCSI Protocol to Route SCSI Requests and Responses, page 1-5
- Basic Network Structure, page 1-6
- SCSI Routing Mapping and Access Control, page 1-6
- Available Instances of SCSI Routing, page 1-9

Note Along with FC storage, FC host connections and FC switch connections are allowed; however, most of the illustrations in this manual show only storage connections for the purpose of describing the SN 5428-2 Storage Router features.

Using iSCSI Protocol to Route SCSI Requests and Responses

SCSI routing consists of routing SCSI requests and responses between hosts in an IP network and FC storage. (See Figure 1-5.)

Figure 1-5 Routing SCSI Requests and Responses for SCSI Routing

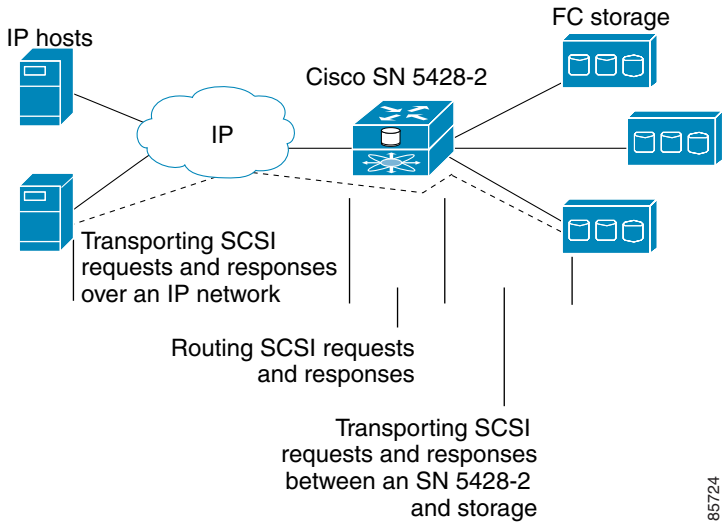


Each host that requires IP access to storage via an SN 5428-2 Storage Router needs to have a compatible iSCSI driver installed. Using the iSCSI protocol, the iSCSI driver allows an IP host to transport SCSI requests and responses over an IP network. From the perspective of a host operating system, the iSCSI driver appears to be a SCSI or Fibre Channel driver for a peripheral channel in the host.

SCSI routing consists of the following main actions (See Figure 1-6):

- Transporting SCSI requests and responses over an IP network between the hosts and the SN 5428-2 Storage Router
- Routing SCSI requests and responses between hosts on an IP network and FC storage
- Transporting SCSI requests and responses between the SN 5428-2 Storage Router and FC storage

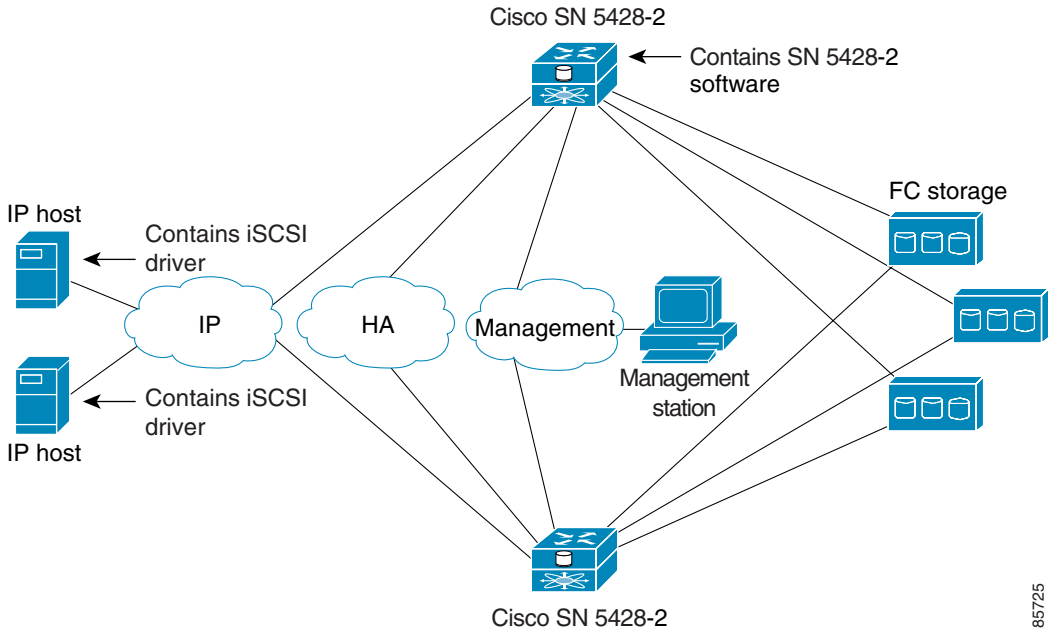
Figure 1-6 SCSI Routing Actions



Basic Network Structure

Figure 1-7 shows the basic structure of a SCSI routing network. IP hosts with iSCSI drivers access the storage routers through an IP network connected to the Gigabit Ethernet interface of each storage router. The storage routers access storage devices connected to the Fibre Channel interfaces of each storage router. A management station manages the storage routers through an IP network connected to the management interface of each storage router. For high availability (HA) operation, the storage routers communicate with each other over two networks: the HA network connected to the HA interface of each storage router and the management network connected to the management interface of each storage router.

Figure 1-7 SCSI Routing Basic Network Structure



SCSI Routing Mapping and Access Control

SCSI routing occurs in the SN 5428-2 Storage Router through the mapping of physical storage devices to iSCSI targets. An iSCSI target is an arbitrary name for a group of physical storage devices. You can map an iSCSI target to multiple physical devices. An iSCSI target always contains at least one Logical Unit Number (LUN). Each LUN on an iSCSI target is mapped to a single LUN on a physical storage target.

You can choose either of two types of storage mapping: target-and-LUN mapping or target-only mapping. Target-and-LUN mapping maps an iSCSI target and LUN combination to a physical storage target and LUN combination. Target-only mapping maps an iSCSI target to a physical storage target and its LUNs.

With target-and-LUN mapping, an iSCSI target name and iSCSI LUN number are specified and mapped to the physical storage address of one LUN; either a WWPN + LUN (World Wide Port Name + LUN) combination, a LUN ID (unique LUN identifier), or a LUN serial number.

If the LUN is available, it is made available as an iSCSI LUN and numbered with the iSCSI LUN number specified. For example, if an iSCSI target and iSCSI LUN specified as *Database, LUN 9* were mapped to the physical storage address, *WWPN 3100112233445566*, *LUN 12*, then LUN 12 would be available as one iSCSI LUN. An iSCSI driver would see the iSCSI target named *Database,* with one iSCSI LUN identified as *LUN 9*. The iSCSI LUN would appear as one storage device to a host. (See Table 1-1.)

Table 1-1 Target-and-LUN Mapping Example

Apparent to Host as Local Disk	iSCSI Target Name	iSCSI LUN Available	Physical Storage Address	Physical LUN Available
Local Disk (D:)	Database	LUN 9	WWPN 3100112233445566	LUN 12
Apparent as one locally attached storage device.	*Database* appears as one controller with one LUN available.	iSCSI LUN is numbered as specified and can be different than the physical LUN number.	Specifies the storage address of a storage controller.	The LUN number is specified as the only LUN to be mapped.

With target-only mapping, an iSCSI target name is specified and mapped to the physical storage address of a storage controller only; a WWPN. Any LUNs that are available in the storage controller are made available as iSCSI LUNs and are numbered the same as the LUNs in the storage controller. For example, if an iSCSI target specified as *Webserver2000* were mapped to the physical storage address *WWPN* 3100112233445577, and LUNs 0 through 2 were available in that controller, those LUNs would become available as three iSCSI LUNs. An iSCSI driver would see the iSCSI target named *Webserver2000* as a controller with three iSCSI LUNs identified as *LUN 0*, *LUN 1*, and *LUN 2*. Each iSCSI LUN would appear as a separate storage device to a host. (See Table 1-2.)

Table 1-2 Target-only Mapping Example

Apparent to Host as Local Disk	iSCSI Target Name	iSCSI LUNs Available	Physical Storage Address	Physical LUNs Available
Local Disk (D:)	Webserver2000	LUN 0	WWPN 3100112233445577	LUN 0
Local Disk (E:)	Webserver2000	LUN 1	WWPN 3100112233445577	LUN 1
Local Disk (F:)	Webserver2000	LUN 2	WWPN 3100112233445577	LUN 2
Apparent as three locally attached storage devices.	*Webserver2000* appears as one controller with LUNs 0, 1, and 2 available.	iSCSI LUNs are numbered the same as physical LUNs.	Specifies the storage address of a storage controller.	LUNs 0, 1, and 2 are available for mapping.

Access for SCSI routing is controlled in the IP hosts and the storage router. In an IP host, the iSCSI driver is configured with the Gigabit Ethernet IP address of the SCSI routing instance in the storage router with which the host is to transport SCSI requests and responses. In a storage router, access is controlled through an access list and a VLAN identifier (VID) number of the hosts. Additionally, access can be further controlled in the SN 5428-2 through authentication. See the "Authentication Overview" section on page 1-22 for more information about authentication.

An access list enables access to storage devices attached to the SN 5428-2 according to any combination of host IP address(es), CHAP user name(s), or iSCSI name(s). An access list contains these combinations of hosts allowed to access the storage devices. Host VID enables access to storage devices according to the VID of each host. See the "VLAN Access Overview" section on page 1-18 for more information about VLAN access.

For each iSCSI target, you can associate one access list allowing read/write access, and one access list allowing read-only access. See Chapter 6, "Configuring SCSI Routing," for more information about read/write and read-only access.

You can use a combination of access lists and VIDs to configure access in the SN 5428-2; that is, you can specify that certain hosts according to IP address in a VLAN can access storage devices attached to the SN 5428-2.

Once the access is configured in the hosts and the SN 5428-2, and once the storage mapping is configured in the SN 5428-2, the SN 5428-2 routes SCSI requests and responses between hosts and the mapped storage devices.

Figure 1-8 represents the concept of storage mapping and access control for SCSI routing. In the figure, the SN 5428-2 Storage Router provides three IP hosts with IP access to disk drives across four disk controllers. The SN 5428-2 contains two SCSI routing instances: one configured with IP address 10.1.2.3 for the Gigabit Ethernet interface and the other with IP address 10.1.2.4. The iSCSI drivers in each IP host are configured to access those SCSI routing instances by their IP addresses through the Gigabit Ethernet interface. An access list in the storage router or VID (or both) specifies that hosts A, B, and C are allowed to access the mapped storage devices. From the perspective of a host, each disk drive mapped to it appears as a locally attached disk drive. Table 1-3 shows the correlation between an access list and/or VID, the Gigabit Ethernet IP addresses of the SCSI routing instances, and the storage device mapping.

Note The purpose of Figure 1-8 and Table 1-3 is only to illustrate the concept of storage mapping and access control. The IP addresses will vary according to each site. Similarly, the type of storage addressing (for example, LUN ID, WWPN + LUN or LUN serial number) will vary according to the types of storage and the types of storage addressing preferred at each site. In addition, the figure and the table exclude any additional SN 5428-2 Storage Routers that could be configured for high availability.

Figure 1-8 SCSI Routing Storage Mapping and Access Control Concept

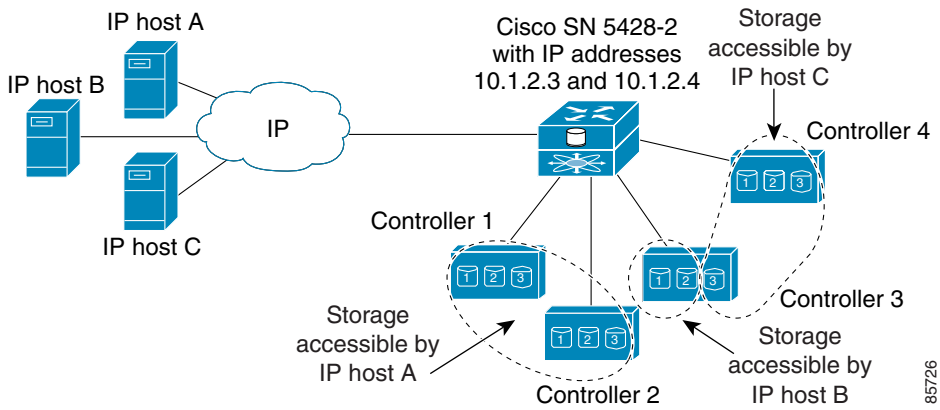


Table 1-3 SCSI Routing Storage Mapping and Access Control Concept

Hosts Allowed Access via SN 5428-2 Access List and/or VID	Storage Devices Apparent to Host as Locally Attached Devices	Via GbE IP Addresses of SCSI Routing Instances	Mapped To Controller	Mapped To Drive
Host A	Local Disk (D:)	10.1.2.3	1	1
	Local Disk (E:)	10.1.2.3	1	2
	Local Disk (F:)	10.1.2.3	1	3
	Local Disk (G:)	10.1.2.3	2	1
	Local Disk (H:)	10.1.2.3	2	2
	Local Disk (I:)	10.1.2.3	2	3
Host B	Local Disk (D:)	10.1.2.3	3	1
	Local Disk (E:)	10.1.2.3	3	2
Host C	Local Disk (D:)	10.1.2.4	4	1
	Local Disk (E:)	10.1.2.4	4	2
	Local Disk (F:)	10.1.2.4	4	3
	Local Disk (G:)	10.1.2.4	3	3

Available Instances of SCSI Routing

You can configure an SN 5428-2 Storage Router with up to 12 instances of SCSI routing services. Each instance needs to be configured with the following:

- One or more unique IP addresses assigned to either one or both Gigabit Ethernet interfaces
- Mapping between iSCSI target names and physical storage addresses
- Access control

When an SN 5428-2 is part of a cluster, an instance of SCSI routing can run on only one storage router in a cluster at any given time. See the "SN 5428-2 Cluster Management Overview" section on page 1-22 for more information about storage router clusters.

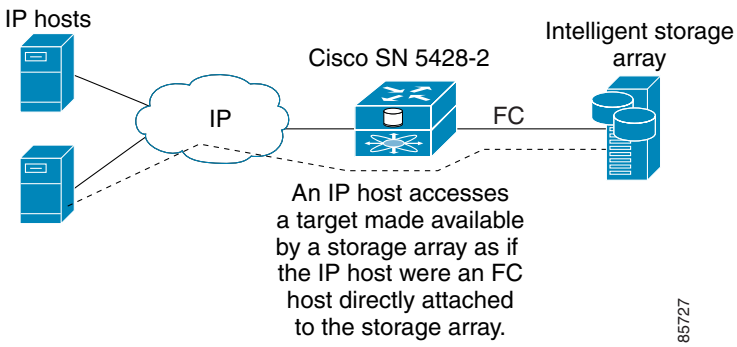
Transparent SCSI Routing Overview

Transparent SCSI routing provides IP hosts with access to intelligent storage arrays as if each storage array were directly attached to the hosts, with access to the storage devices managed primarily in each storage array. The SN 5428-2 transparently presents each IP host to the storage array as if each host were an FC host.

Typically, transparent SCSI routing is used with an intelligent storage array that is directly connected to the SN 5428-2 Fibre Channel interface. Managing access to storage devices consists of using configuration tools available with an intelligent storage array (to configure, for example, which hosts are granted access and to configure multiple paths between hosts and storage devices). With transparent SCSI routing, an intelligent storage array can manage each IP host as if it were directly attached to the array as an FC host.

Transparent SCSI routing automatically creates iSCSI targets and maps them to physical targets available in the intelligent storage array. The storage router presents the iSCSI targets to IP hosts as if the physical targets were directly attached to the hosts. In conjunction with presenting iSCSI targets to hosts, transparent SCSI routing presents each IP host as an FC host to the intelligent storage array. The intelligent storage array is aware of each IP host and responds to each IP host as if it were an FC host connected to the storage array. (See Figure 1-9.) Transparent SCSI routing can present no more than 62 IP hosts as FC hosts to an intelligent storage array.

Figure 1-9 Transparent SCSI Routing Overview


IP hosts
Cisco SN 5428-2
Intelligent storage array
IP
FC
An IP host accesses a target made available by a storage array as if the IP host were an FC host directly attached to the storage array.
85727

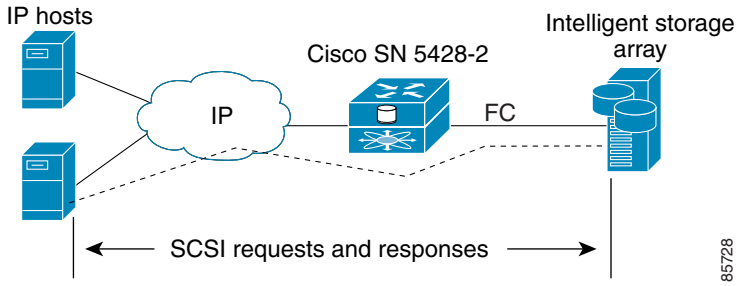
To configure an SN 5428-2 Storage Router that is deployed for transparent SCSI routing, you should have a basic understanding of the following concepts:

- Using iSCSI Protocol to Route SCSI Requests and Responses, page 1-11
- Basic Network Structure, page 1-12
- Transparent SCSI Routing Mapping and Access Control, page 1-12
- Available Instances of Transparent SCSI Routing, page 1-15

Using iSCSI Protocol to Route SCSI Requests and Responses

Transparent SCSI routing consists of routing SCSI requests and responses between hosts in an IP network and an intelligent storage array that is directly connected to an SN 5428-2 Fibre Channel interface. (See Figure 1-10.)

Figure 1-10 Routing SCSI Requests and Responses for Transparent SCSI Routing

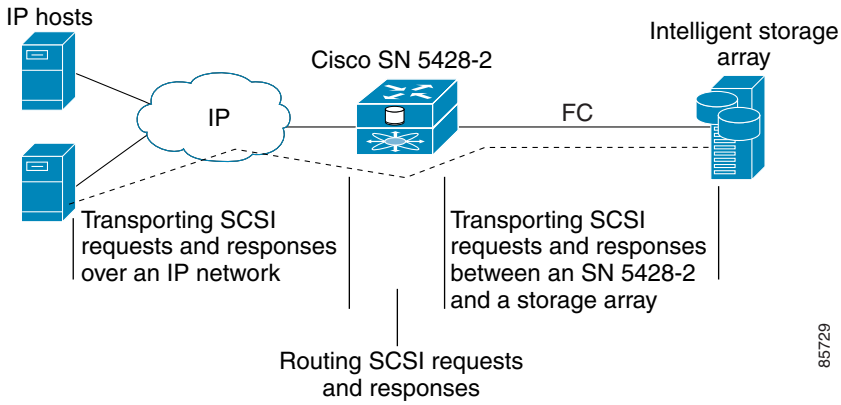


Each host that requires IP access to storage via an SN 5428-2 Storage Router needs to have a compatible iSCSI driver installed. Using the iSCSI protocol, the iSCSI driver allows an IP host to transport SCSI requests and responses over an IP network. From the perspective of a host operating system, the iSCSI driver appears to be a SCSI or Fibre Channel driver for a peripheral channel in the host. From the perspective of the storage array, each IP host appears as an FC host (with one Fibre Channel address for each host).

Transparent SCSI routing consists of the following main actions (Figure 1-11):

- Transporting SCSI requests and responses over an IP network between the hosts and the SN 5428-2 Storage Router.
- Routing SCSI requests and responses between hosts on an IP network and an intelligent storage array.
- Transporting SCSI requests and responses between the SN 5428-2 Storage Router and an intelligent storage array.

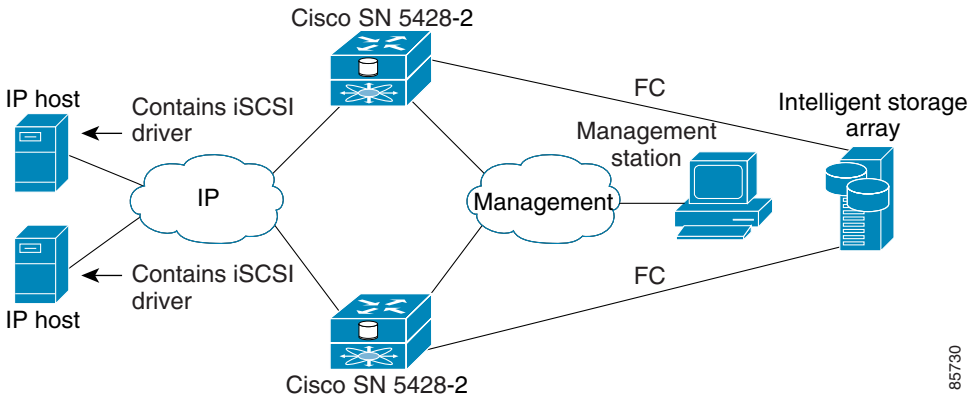
Figure 1-11 Transparent SCSI Routing Actions


IP hosts
Cisco SN 5428-2
Intelligent storage array
IP
FC
Transporting SCSI requests and responses over an IP network
Transporting SCSI requests and responses between an SN 5428-2 and a storage array
Routing SCSI requests and responses
85729

Basic Network Structure

Figure 1-12 shows the basic structure of a transparent SCSI routing network. IP hosts with iSCSI drivers access the storage routers through an IP network connected to one of the Gigabit Ethernet interfaces of each storage router. The storage routers access the intelligent storage array through a Fibre Channel interface of each storage router. A management station manages the storage routers through an IP network connected to the management interface of each storage router. High availability operation for transparent SCSI routing is controlled in the intelligent storage array; therefore, an SN 5428-2 HA network is not necessary, and the HA interface on the SN 5428-2 is disabled.

Figure 1-12 Transparent SCSI Routing Basic Network Structure



Transparent SCSI Routing Mapping and Access Control

Transparent SCSI routing occurs in an SN 5428-2 Storage Router through two types of mapping:

- Mapping iSCSI targets to physical targets
- Mapping each IP host to a Fibre Channel (FC) address

Mapping iSCSI targets to physical targets makes the physical targets accessible to IP hosts. Mapping each IP host to an FC address—which maps the iSCSI client in the IP host to the internal FC initiator WWPN—allows the host to be presented to a storage array as an FC host with its own FC WWPN.

Mapping iSCSI targets to physical targets consists of creating iSCSI targets that represent physical targets in an intelligent storage array. An iSCSI target is an arbitrary name for a group of physical storage devices; one iSCSI target is automatically created for each target made available by the intelligent storage array.

The iSCSI target name is created automatically using the iSCSI extended unique identifier (EUI) format. The EUI format combines the prefix “eui” with each WWPN made available by the intelligent storage array. For example, if the WWPN of a target in a storage array were 3100112233445566, then an iSCSI target would be created in the SN 5428-2 with the iSCSI target name of *eui.3100112233445566*.

Transparent SCSI routing maps iSCSI targets to physical targets using target-only mapping. Target-only mapping maps an iSCSI target to a physical storage target and its LUNs. Any LUNs that are available with a physical WWPN in the storage array are available with the corresponding iSCSI target and are numbered the same as the LUNs in the storage array.

For example, if an iSCSI target were created for WWPN 3100112233445566 in a storage array, and that WWPN contained LUNs 0 through 2, those LUNs would become available to an IP host as LUNs 0 through 2. An iSCSI driver would see the iSCSI target named *eui.3100112233445566* as a controller with three iSCSI LUNs identified as *LUN 0*, *LUN 1*, and *LUN 2*. Each iSCSI LUN would appear as a separate storage device to an IP host.

Mapping each IP host to a Fibre Channel address consists of assigning a WWPN to an IP host that is requesting access to storage; the WWPN is used for presenting the IP host as an FC host to a storage array. The SN 5428-2 maintains a pool of 62 WWPNs that are assigned to IP hosts requesting access to storage. When an IP host is granted access, a WWPN is assigned to the IP host and the SN 5428-2 presents the host as an FC host to the storage array. That host continues using that WWPN until it is finished using the storage. When transparent SCSI routing is deployed in dynamic mode, once the host is finished using the storage (logged out), the WWPN becomes available for assignment to other IP hosts requiring access to storage. In static mode, the IP host/WWPN mapping is retained throughout IP host logins and logouts and throughout storage router reboots.

See Table 1-4 for an example of transparent SCSI routing mapping. In this mapping example, the WWPN, 200100023D000100, is assigned to the IP host. Using that WWPN, the SN 5428-2 presents the IP host as an FC host to the storage array. Three devices are made available as local storage devices: Local Disk (E:), Local Disk (F:), and Local Disk (G:). (Microsoft Windows devices are used as examples.) The iSCSI target, eui.3100112233445566, has been automatically created and mapped to a WWPN, 3100112233445566, that was made available by the storage array. To the IP host, the iSCSI target appears as a controller with LUNs 0, 1, and 2 available. The LUNs are apparent as they are with the WWPN in the storage array.

Table 1-4 Transparent SCSI Routing Mapping Example

WWPN assigned to IP Host	Apparent to IP Host	iSCSI Target Name	LUNs Apparent with iSCSI Target	WWPN of Storage Array Target	Physical LUNs Available
200100023D000100	Local Disk (E:)	eui.3100112233445566	LUN 0	3100112233445566	LUN 0
	Local Disk (G:)	eui.3100112233445566	LUN 1	3100112233445566	LUN 1
	Local Disk (H:)	eui.3100112233445566	LUN 2	3100112233445566	LUN 2

Access for transparent SCSI routing is controlled in the IP hosts and the intelligent storage array. In an IP host, the iSCSI driver is configured with the Gigabit Ethernet IP address of the SCSI routing instance in the storage router with which the host is to transport SCSI requests and responses. In the intelligent storage array, access is controlled through its storage management tools. Additionally, access can be further controlled in the SN 5428-2 through authentication. See the "Authentication Overview" section on page 1-22 for more information about authentication.

Once the access is configured in the hosts and the intelligent storage array, the SN 5428-2 transparently routes SCSI requests and responses between hosts and the mapped storage devices.

Figure 1-13 represents the concept of storage mapping and access control for transparent SCSI routing. In the figure, the SN 5428-2 Storage Router provides three IP hosts with access to disk drives made available by the intelligent storage array. A single SCSI routing instance in the storage router is configured with IP address 10.1.2.3 for the Gigabit Ethernet interface. The iSCSI driver in each IP host is configured to access that SCSI routing instance by its IP address 10.1.2.3 through the Gigabit Ethernet interface on the storage router. From the perspective of an IP host, each disk drive mapped to it appears as a locally attached disk drive. From the perspective of the storage array, each host is connected directly

to it, with each host having a WWPN. Table 1-5 shows the correlation between the IP hosts, the Gigabit Ethernet IP address of the SCSI routing instance, storage device mapping, and IP-host-to-FC-address (WWPN) mapping.

Note The purpose of Figure 1-13 and Table 1-5 is only to illustrate the concept of storage mapping, FC address mapping, and access control. The IP addresses and WWPNs will vary according to each site. In addition, the figure and the table exclude any additional SN 5428-2 Storage Routers that could be configured for multiple paths between hosts and storage devices.

Figure 1-13 Transparent SCSI Routing Storage Mapping and Access Control Concept

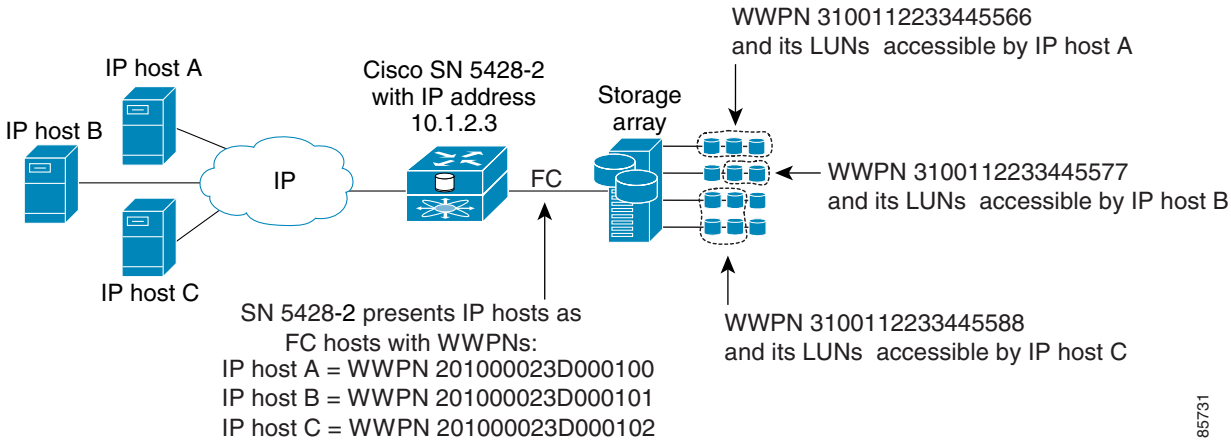


Table 1-5 Transparent SCSI Routing Storage Mapping and Access Control Concept

Hosts Allowed Access by Intelligent Storage Array and SN 5428-2 Authentication	Storage Devices Apparent to Host as Locally Attached Devices	Via GbE IP Address of SCSI Routing Instance	Mapped To Storage	
			WWPN	Drive (LUN)
Host A: apparent to storage array as FC host with WWPN 201000023D000100	Local Disk (D:)	10.1.2.3	3100112233445566	0
	Local Disk (E:)	10.1.2.3	3100112233445566	1
	Local Disk (F:)	10.1.2.3	3100112233445566	2
Host B: apparent to storage array as FC host with WWPN 201000023D000101	Local Disk (D:)	10.1.2.3	3100112233445577	0
	Local Disk (E:)	10.1.2.3	3100112233445577	1
Host C: apparent to storage array as FC host with WWPN 201000023D000102	Local Disk (D:)	10.1.2.3	3100112233445588	0
	Local Disk (E:)	10.1.2.3	3100112233445588	1
	Local Disk (F:)	10.1.2.3	3100112233445588	2
	Local Disk (G:)	10.1.2.3	3100112233445588	3

Available Instances of Transparent SCSI Routing

When an SN 5428-2 Storage Router is deployed for transparent SCSI routing, it is automatically configured for one instance of transparent SCSI routing service; only that one instance can exist in that SN 5428-2.

While the instance of transparent SCSI routing needs to be configured with a Gigabit Ethernet IP address, mapping between iSCSI target names and physical storage addresses is automatic and cannot be configured.

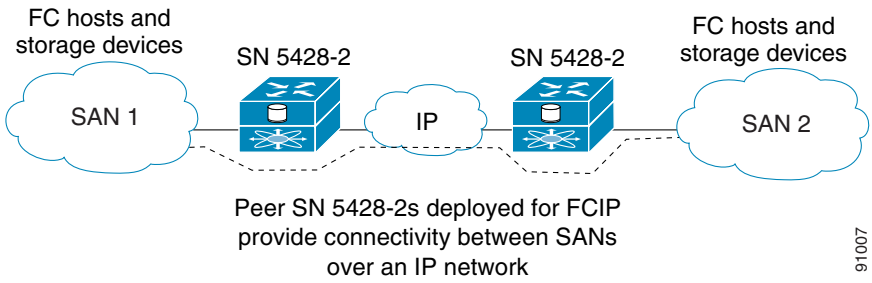
When an SN 5428-2 is deployed for transparent SCSI routing, it cannot participate in a storage router cluster. However, multiple SN 5428-2s can be connected to an intelligent storage array, where it is possible to manage failover and multiple paths. In networks where multiple SN 5428-2 Storage Routers are connected to an intelligent storage array, each SN 5428-2 has one (and only one) instance of transparent SCSI routing; the instance is unique to that storage router and cannot fail over to another storage router.

FCIP Overview

Fibre Channel over IP (FCIP) enables two or more peer SN 5428-2 Storage Routers to provide connectivity between FC hosts and FC storage devices over an IP network.

To deploy FCIP, at least two SN 5428-2 Storage Routers are required, each configured for FCIP and connected to a SAN (or to any FC host or FC device). The peer storage routers are connected to each other through an IP network. (See Figure 1-14.)

Figure 1-14 FCIP Overview



An FC host or FC device needs no additional hardware or software to access storage devices via an SN 5428-2 Storage Router deployed for FCIP.

To configure an SN 5428-2 Storage Router deployed for FCIP, you need a basic understanding of the following concepts:

- Using FCIP to Route Fibre Channel Packets, page 1-15
- FCIP Network Structures, page 1-16

Using FCIP to Route Fibre Channel Packets

With FCIP, peer SN 5428-2 Storage Routers transport FC frames over an IP network. From the perspective of the SANs, the storage devices accessed through the SN 5428-2s appear to be part of one unified SAN.

Once configured, FCIP instances on each storage router become active and establish their connectivity via the IP network. The storage devices in one SAN access the storage devices in the connected SAN using FC frames, which are encapsulated in IP packets by the FCIP instance running in the SN 5428-2, and transmitted to the peer SN 5428-2. The peer FCIP instance strips the IP packet data and passes only the FC frames over the FC interfaces to the storage devices.

The peer SN 5428-2 Storage Routers deployed for FCIP must be configured to use the same protocol: TCP or raw. TCP protocol uses standard TCP flow control and error recovery algorithms. Raw protocol uses a proprietary connection protocol, but provides more operational control over flow control and error recovery than standard TCP/IP.

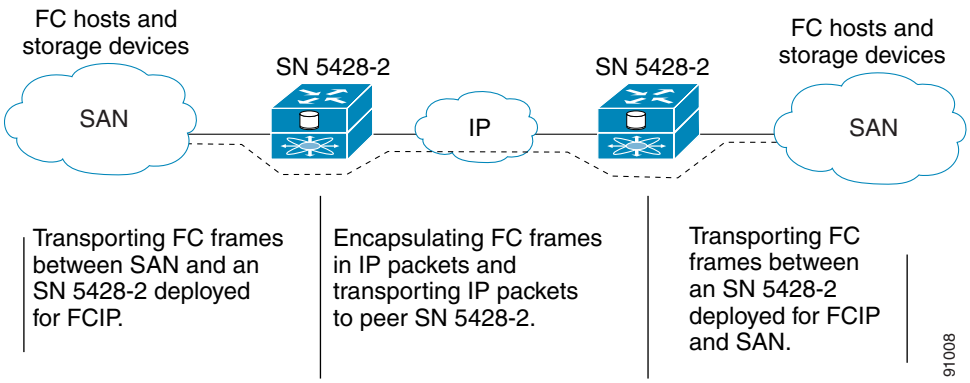
If the selected protocol is TCP, one FCIP instance must be configured as the TCP client; the other FCIP instance must be configured as the TCP server. The only difference between FCIP instances configured as TCP client and TCP server is which FCIP instance initiates the connection: the TCP client initiates the connection.

FCIP transports FC frames between SANs by performing the following actions (Figure 1-15):

- Transporting FC frames between a SAN and an SN 5428-2 that is deployed for FCIP
- Encapsulating FC frames in IP packets and transporting the IP packets to a peer SN 5428-2 that is deployed for FCIP
- Receiving IP packets and transporting as FC frames between the peer SN 5428-2 and a connected SAN

Note that FC traffic is carried over the IP network in such a way that the FC fabric and all FC devices on the fabric are unaware of the presence of the IP Network.

Figure 1-15 FCIP Actions


FC hosts and storage devices
SN 5428-2
SN 5428-2
FC hosts and storage devices
SAN
IP
SAN
Transporting FC frames between SAN and an SN 5428-2 deployed for FCIP.
Encapsulating FC frames in IP packets and transporting IP packets to peer SN 5428-2.
Transporting FC frames between an SN 5428-2 deployed for FCIP and SAN.
91008

FCIP Network Structures

This section describes typical FCIP network structures. In all of these examples, a management station (not shown) manages the storage routers through an IP network connected to the management interface and/or HA interface of each storage router.

Figure 1-14 represents a basic, non-redundant structure of an FCIP network configuration. An FC host or FC device connects to one or more Fibre Channel interfaces of each peer SN 5428-2 Storage Router deployed for FCIP. Each SN 5428-2 connects to the IP network through one of its Gigabit Ethernet interfaces. Through the IP network, each FCIP instance accesses its peer, thereby connecting the SANs.

Figure 1-16 shows a slightly more complex FCIP network: a redundant WAN FCIP configuration. In this configuration, an FC host or FC device connects to one or more Fibre Channel interfaces of each peer SN 5428-2 Storage Router deployed for FCIP, and each SN 5428-2 connects to two separate IP networks through each of its Gigabit Ethernet interfaces. Through the IP network, each FCIP instance accesses the peer storage router deployed for FCIP, connecting the SANs. In this configuration, IP A and IP B are redundant paths, so that the loss of connectivity via either path does not cause a loss of connectivity between the SANs.

Figure 1-16 FCIP Redundant WAN Configuration

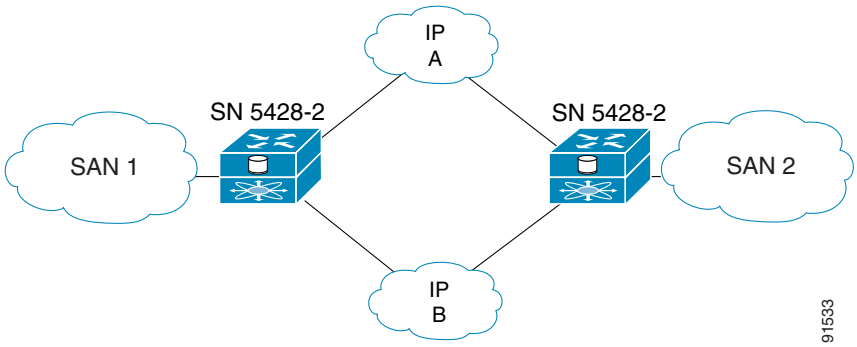
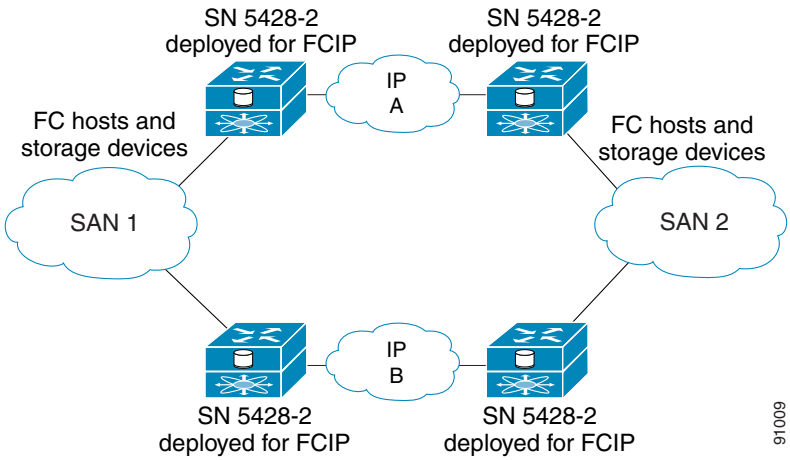


Figure 1-17 shows an even more reliable FCIP configuration, in which pairs of SN 5428-2s provide full redundancy. In this configuration, loss of an SN 5428-2 or loss of connectivity through one of the IP networks can be tolerated with no loss of connectivity between the SANs.

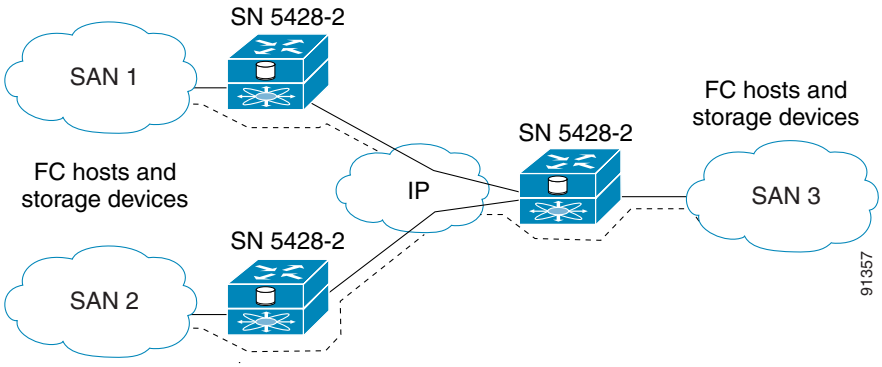
Figure 1-17 FCIP Fully Redundant Configuration



Note For multiple paths between SANs, multiple pairs of SN 5428-2s deployed for FCIP need to be connected to the FC hosts or FC devices. However, multiple SN 5428-2 Storage Routers deployed for FCIP cannot be configured in an HA cluster. It is assumed that the multipath management is being done by an entity outside the SN 5428-2s (for example, by management applications on the FC host or storage devices).

Figure 1-18 shows an alternative network structure for FCIP, in which FCIP tunnels are established from two SANs aggregated to a central site. The SN 5428-2 at the central site has one FCIP instance set up for SAN 1, and the other FCIP instance set up for SAN 2.

Figure 1-18 Multisite FCIP Configuration

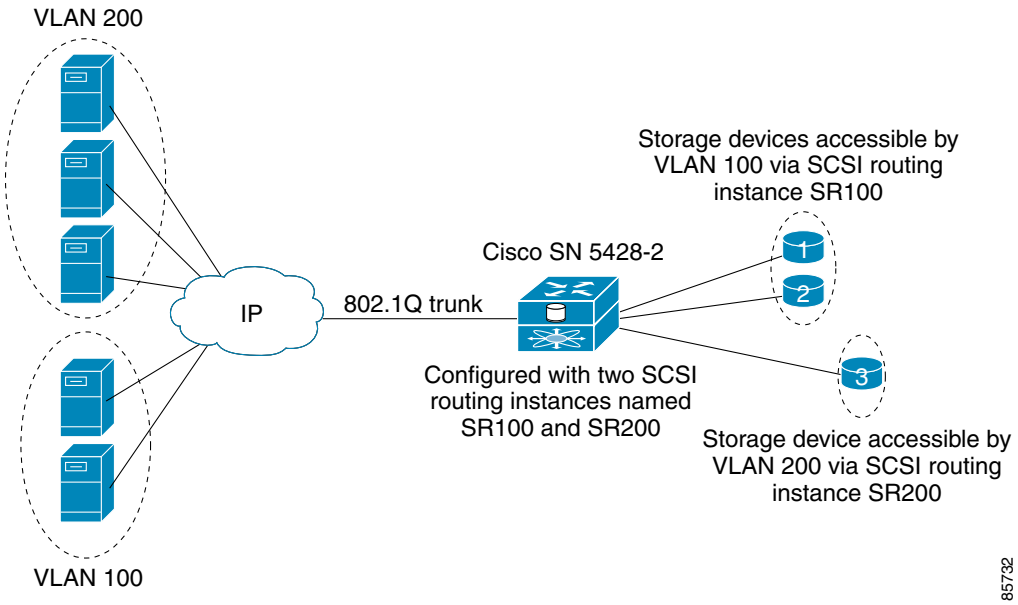


VLAN Access Overview

SN 5428-2 VLAN access provides IP hosts with access to storage devices according to the VLAN to which each host belongs.

Figure 1-19 shows a sample network that employs SN 5428-2 VLAN access. In the figure, an SN 5428-2 Gigabit Ethernet interface is connected to an IP network through an IEEE 802.1Q trunk; the SN 5428-2 Fibre Channel interfaces are connected to storage devices 1, 2, and 3. The SN 5428-2 is configured with two SCSI routing instances named SR100 and SR200. The IP network contains two VLANs: VLAN 100 and VLAN 200. The SCSI routing instance, SR100, is configured to allow the hosts in VLAN 100 to access storage devices 1 and 2. The SCSI routing instance, SR200, is configured to allow the hosts in VLAN 200 to access storage device 3.

Figure 1-19 VLAN Access Overview



If the SN 5428-2 is used in a Cisco switched network environment, configure the SN 5428-2 to use the Cisco proprietary VLAN Trunking Protocol (VTP). With VTP, the SN 5428-2 will exchange VTP packets with an externally attached switch to dynamically learn about the VLANs that are accessible in the IP network. The SN 5428-2 then uses VTP to propagate VLAN information around the switched network using layer 2 multicast packets.

If the SN 5428-2 is used in a non-Cisco switched network environment, configure the SN 5428-2 for VLAN without using VTP. The SN 5428-2 does not exchange VTP packets to learn about the VLANs in the network. Instead, you must manually assign VLANs in the network with a VLAN identifier (VID) number. You can optionally assign each VLAN with a unique name and manually set the MTU size.

If the SN 5428-2 participates in a cluster, the VLAN information configured for the SN 5428-2 is propagated to all storage routers in the cluster.

The SN 5428-2 uses IEEE 802.1Q standard for VLAN encapsulation. With 802.1Q encapsulation, VLAN information is carried in packets sent and received through the SN 5428-2 Gigabit Ethernet interface. These packets contain the VID and other VLAN information needed for VLAN members to participate in a VLAN.

A VLAN is granted access to storage devices via a SCSI routing instance configured in the SN 5428-2. The iSCSI targets assigned to the SCSI routing instance determine which storage devices the VLAN can access.

Zoning Overview

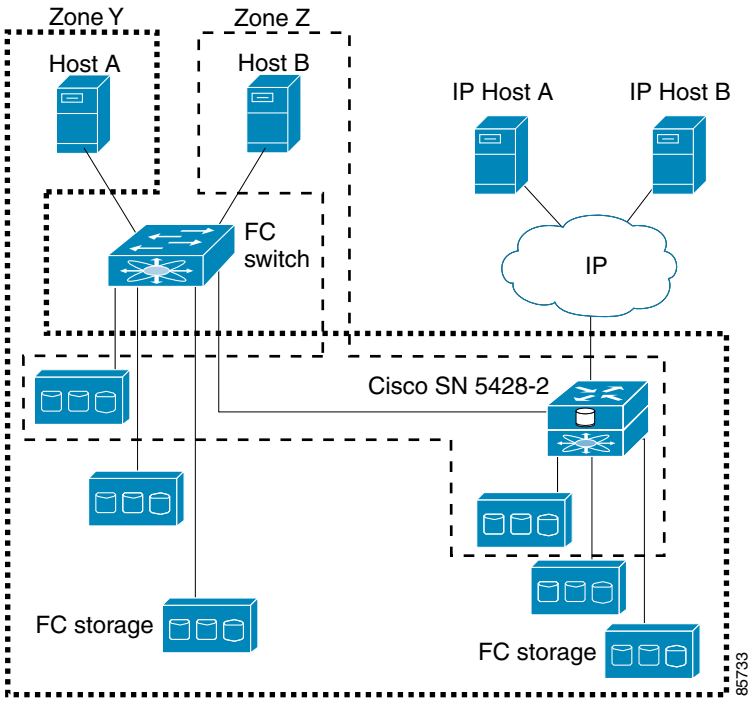
The SN 5428-2 supports FC fabric zoning. Zoning enables you to divide the devices of the fabric into zones for more efficient and secure communication among functionally grouped nodes.

Note FC fabric zoning participation is not supported in SN 5428-2s deployed for transparent SCSI routing.

Once initiator WWPN1 and initiator WWPN2 are configured, the SN 5428-2 will support fabric zoning using the WWPNs of each FC storage device attached, either directly or on a fabric. The IP hosts participate in zoning via the access list. See the "SCSI Routing Mapping and Access Control" section on page 1-6 for more information about access lists.

Figure 1-20 shows an example network that employs SN 5428-2 FC fabric zoning. In the figure, the SN 5428-2 is connected to IP hosts A and B through the Gigabit Ethernet interface; the SN 5428-2 Fibre Channel interfaces are connected to FC storage and a zoned FC switched fabric. The IP hosts are allowed access to storage devices in both zones (Y and Z) and storage devices attached to the SN 5428-2. Zone Y has access to all the SN 5428-2 storage devices and zone Z has access to one storage device on the SN 5428-2.

Figure 1-20 FC Fabric Zoning Overview



Zoning comprises zones, zone sets, aliases, and zone databases.

A zone is a named group of devices that can communicate with each other. Membership in a zone is defined by the device WWPN. Zone members can communicate only with members of the same zone. The SN 5428-2 supports the soft zone type. Soft zones can overlap; that is, a device can be a member of more than one soft zone.

To make it easier to add devices to one or more zones, you can create an alias. An alias is a named set of devices that are grouped together for convenience. You can add an alias to one or more zones. However, you cannot add a zone to an alias, nor can an alias be a member of another alias.

You can also use an alias to name a single device. This allows you to refer to the device by the alias name rather than the WWPN of the device.

A zone set is a named group of zones. A zone can be a member of more than one zone set.

To apply zoning to a fabric, enable the appropriate zone set. When you enable (or "activate") a zone set, the system compiles zone sets of the same name from all SN 5428-2s and switches in the fabric, and then redistributes this merged active zone set back to every SN 5428-2 and switch in the fabric. Therefore, every SN 5428-2 and switch in the fabric will have identical active zone sets.

The SN 5428-2 supports multiple zone sets, but only one zone set can be active in the fabric at any given time.

Each SN 5428-2, like other switches in the zoned FC switched fabric, has its own zoning database. The zoning database is made up of all aliases, zones, and zone sets that have been created on the SN 5428-2 or received from other switches in the fabric. When you modify aliases, zone or zone sets, the changes are immediately saved to the SN 5428-2 bootable configuration.

The Auto Save zoning configuration parameter controls whether zoning changes received from other SN 5428-2s or switches in the fabric are automatically saved to the SN 5428-2s zoning database.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about configuring the SN 5428-2 for FC fabric zoning.

Fibre Channel Interface Overview

The SN 5428-2 has an integrated switch component with Fibre Channel interfaces that support the following port types: E_Port, F_Port, FL_Port, G_Port, GL_Port, TL_Port, and donor port.

The SN 5428-2 FC interfaces support GS-3 management server commands. This allows management of the SN 5428-2 integrated switch component through the Fibre Channel interfaces (in-band management). See the interface fc? ms-enable command in Chapter 12, "Command Line Interface Reference," for more information about enabling the FC interfaces for GS-3 commands.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about configuring FC ports.

Gigabit Ethernet Interface Overview

Each of the two 1-Gigabit Ethernet interfaces on the SN 5428-2 (GE 1 and GE 2) provide the following capabilities:

- Multiple IP addresses per SCSI routing instance—allows IP hosts to connect to SCSI routing instances via one or more IP addresses. Each Gigabit Ethernet interface can be configured with up to 12 unique IP addresses, which provides a maximum of 24 unique IP addresses per SN 5428-2 Storage Router. If VLAN access is used, the maximum number of unique IP addresses per Gigabit Ethernet interface increases to 16. This provides a maximum of 32 unique IP addresses per SN 5428-2 Storage Router when configured with VLAN.
- Assignment of a secondary interface per SCSI routing instance—allows the same IP address to be assigned to each Gigabit Ethernet interface; one interface is assigned as primary and one interface is assigned as secondary. If the primary Gigabit Ethernet interface loses connection to the host and if the secondary connection is assigned and still connected, the IP address moves to the secondary Gigabit Ethernet interface, which then becomes active.
- Assignment as an interface to an FCIP peer—allows assignment of an IP address as a primary Gigabit Ethernet interface between an FCIP instance and an FCIP peer. Each SN 5428-2 can be configured with up to two FCIP instances, and each FCIP instance can be configured with one peer, for a maximum of two FCIP peers per SN 5428-2 Storage Router when configured for FCIP.
- Assignment of a secondary interface per FCIP instance—allows the same IP address to be assigned to each Gigabit Ethernet interface configured for an FCIP instance; one interface is assigned as primary and one interface is assigned as secondary. If the primary interface loses connection to the network and remains down for two seconds, the IP address moves to the secondary Gigabit Ethernet interface, which then becomes active.
- Assignment as a management IP address—allows each Gigabit Ethernet interface to have one IP address assigned per logical interface, as a management interface. This IP address is in addition to any multiple IP address(es) per SCSI routing instance or FCIP instance assigned.
- Assignment of a secondary management IP address—allows the same IP address to be assigned to each Gigabit Ethernet interface configured as a management interface; one interface is assigned as primary and one interface is assigned as secondary. If connection to the primary Gigabit Ethernet

maintenance interface is lost and if the secondary maintenance interface connection is assigned and connected, the IP address moves to the secondary Gigabit Ethernet interface, which then allows management access.

Authentication Overview

Authentication is a software service that is available in each SN 5428-2. It provides a method of identifying users (including login and password dialog, challenge and response, and messaging support) prior to receiving access to the requested object, function, or network service. The SN 5428-2 supports three types of authentication:

- iSCSI authentication—provides an authentication mechanism to authenticate IP hosts that request access to storage. An IP host, acting as an iSCSI initiator, can also verify the identity of an iSCSI target assigned to a SCSI routing instance, which responds to the request, resulting in a two-way authentication.
- Enable authentication—provides a mechanism to authenticate users requesting Administrator mode access to an SN 5428-2 management session via the CLI **enable** command or an FTP session.
- Login authentication—provides a mechanism to authenticate users requesting access to the SN 5428-2 in Monitor mode via the login process from a Telnet session, SSH session or the SN 5428-2 console.

Authentication is provided by an AAA (authentication, authorization, and accounting) subsystem configured in each SN 5428-2. AAA is Cisco's architectural framework for configuring a set of three independent security functions in a consistent and modular manner: authentication, authorization, and accounting. The SN 5428-2 Storage Router software implements the authentication function.

AAA authentication is configured by defining a list of authentication services. iSCSI authentication, which uses a AAA authentication services list, can be enabled for specific SCSI routing instances in an SN 5428-2.

When iSCSI authentication is enabled, IP hosts (with iSCSI drivers) must provide user name and password information each time an iSCSI TCP connection is established. With two-way authentication, the SCSI routing instance to which an iSCSI target has been assigned responds to the authentication request with an assigned username and password. iSCSI authentication uses the iSCSI CHAP (Challenge Handshake Authentication Protocol) authentication method.

See Chapter 9, "Configuring Authentication," for more information about configuring authentication services.

SN 5428-2 Cluster Management Overview

You can configure Cisco SN 5428-2 Storage Routers in a cluster to allow the storage routers to back each other up in case of failure.

Note A storage router can participate in a cluster only if it is deployed for SCSI routing.

An SN 5428-2 Storage Router can be configured in a cluster with one other SN 5428-2, or with an SN 5428, connected as follows:

- Connected to the same hosts
- Connected to the same storage systems

- Connected to each other through their management and high availability (HA) interfaces

In a cluster, storage routers continually exchange HA information to propagate configuration data to each other and to detect failures in the cluster. The storage routers exchange HA information through two separate networks: one connected to the management interface of each storage router and the other connected to the HA interface of each storage router. To make sure that HA information is exchanged reliably between storage routers, the storage routers balance the transmission of HA information between the management and the HA interfaces.

A storage router cluster supports up to 12 active instances of SCSI routing. For example, if one storage router is already running two instances, it is eligible to run up to ten additional instances. At any given time, an instance of SCSI routing can run on only one storage router in a cluster. The instance continues running on the storage router where it was started until one of the following actions occurs:

- The instance is explicitly stopped or failed over to the other storage router in the cluster.
- The instance automatically fails over to another storage router because an interface is unavailable or another software or hardware problem occurs. This automatic fail over uses intelligent eligibility guidelines to determine fail over.

See Chapter 10, "Configuring a High Availability Cluster," for more information about configuring a high availability cluster.

Interface Naming

Configuring the SN 5428-2 Storage Router software requires that you understand hardware interface naming. This section describes the interface naming system used with the SN 5428-2 Storage Router hardware.

Each storage router interface is assigned a three-character name consisting of two lower-case letters followed by a number. The letters designate the interface type; the number designates the chassis slot occupied by the interface (See Figure 1-21).

Figure 1-21 SN 5428-2 Interface Naming System

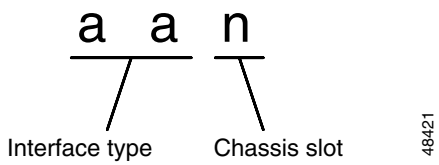
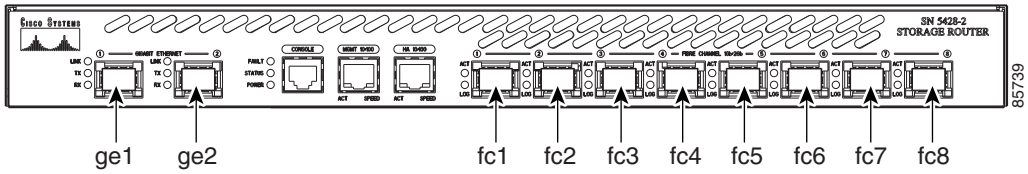


Table 1-6 shows valid interface type designators for the SN 5428-2; Figure 1-22 shows each interface location and interface name on the SN 5428-2.

Table 1-6 Interface Type Designators

Interface Type	Description
fc	Fibre Channel
ge	Gigabit Ethernet

Figure 1-22 SN 5428-2 Chassis-Slot Numbering



Where to Go Next

When you are ready to configure the SN 5428-2 software, proceed to one of the following chapters in this configuration guide according to your needs:

- Chapter 2, “First-Time Configuration”—For initial setup or after configuration has been reset to factory default configuration
- Chapter 3, “Configuring System Parameters”—Using the CLI for setting up and modifying system parameters
- Chapter 4, “Configuring for VLAN”—Using the CLI for setting up and modifying VLAN configurations
- Chapter 5, “Configuring Fibre Channel Interfaces”—Using the CLI for setting up and modifying FC interface and zoning configurations
- Chapter 6, “Configuring SCSI Routing” —Using the CLI for setting up and modifying SCSI routing configurations
- Chapter 7, “Configuring Transparent SCSI Routing” —Using the CLI for setting up and modifying transparent SCSI routing configurations
- Chapter 8, “Configuring FCIP” —Using the CLI for setting up and modifying FCIP configurations
- Chapter 9, “Configuring Authentication”—Using the CLI for setting up and modifying authentication configurations
- Chapter 10, “Configuring a High Availability Cluster”—Using the CLI for setting up and modifying cluster configurations
- Chapter 11, “Maintaining and Managing the SN 5428-2 Storage Router”—Downloading software, backing up and restoring configurations, and other related maintenance and management tasks
- Chapter 12, “Command Line Interface Reference”—For a basic understanding of the command line interface and information on all CLI commands.

Note This guide does not describe how to configure iSCSI drivers. Install and configure iSCSI drivers according to readme and example configuration files for each driver.

CHAPTER 2

First-Time Configuration

This chapter describes what configuration information to gather and explains the initial system configuration script and setup configuration wizard for the first-time configuration of the Cisco SN 5428-2 Storage Router. This chapter also introduces the command line interface (CLI) and web-based GUI, which can be used for subsequent configuration tasks.

Note The web-based GUI is not available in SN 5428-2s deployed for transparent SCSI routing.

This chapter contains the following sections:

- Prerequisite Tasks, page 2-1
- Collecting Configuration Information, page 2-2
- Connecting a Console, page 2-6
- Initial System Configuration Script, page 2-7
- Running the Setup Configuration Wizard, page 2-8
- Introducing the CLI, page 2-10
- Introducing the Web-Based GUI, page 2-12
- Where to Go Next, page 2-14

Prerequisite Tasks

Before configuring the SN 5428-2 Storage Router for the first time, make sure you have completed the hardware installation according to the *Cisco SN* 5428-*2 Storage Router Hardware Installation Guide.*

Collecting Configuration Information

Use the Cisco SN 5428-2 Storage Router First-Time Configuration Checklist (Table 2-1) to help you gather the system and network information that is needed for the first-time configuration of your SN 5428-2 Storage Router. The items in the checklist are based on the information requested by the initial system configuration script and the setup configuration wizard.

Table 2-1 First-Time Configuration Checklist

Configuration Item	Description	Required or Optional	Your Configuration Value
Configuration deployment option	The SN 5428-2 can be configured for one of two kinds of deployments: 1. SCSI routing (SN 5428-2 enables iSCSI hosts to access Fibre Channel storage. SN 5428-2 manages access to the Fibre Channel devices.) 2. Transparent SCSI routing (SN 5428-2 enables iSCSI hosts to access Fibre Channel storage. SN 5428-2 does not manage access to the Fibre Channel devices.) 3. FCIP (SN 5428-2 enables connectivity between SANs. SN 5428-2 does not manage access to the Fibre Channel devices.)	Required	1, 2, or 3
Static or dynamic mode	Static or dynamic deployment for transparent SCSI routing: Static mode saves the iSCSI client-to-FC WWPN bindings, making them persistent across iSCSI client logouts and system reboots. This is the preferred choice for most operations. Dynamic mode resets iSCSI client-to-FC WWPN bindings upon reboots or iSCSI logouts. To deploy dynamic mode, the intelligent storage array connected to the SN 5428 must support an extended iSCSI FC PLOGI frame that contains the iSCSI client's IP address and initiator name, and only recognizes storage devices that support this.	Required for transparent SCSI routing only	
Management interface IP address and subnet mask	The IP address and subnet mask of the storage router management interface. **Note** The management interface for each storage router in a cluster must be on the same IP subnet.	Required	

Table 2-1 First-Time Configuration Checklist (continued)

Configuration Item	Description	Required or Optional	Your Configuration Value
Static route for management interface	The destination IP address with subnet mask and then the gateway IP address.	Required if SN 5428-2 is managed from a subnet other than the one to which it is physically attached, unless the SN 5428-2 will be configured to use RIP listening. See Chapter 3, "Configuring System Parameters."	
System name	The name you want to use for the storage router. If you use the services of a domain name server (DNS), the system name is the same name you will enter and associate with the management interface. Maximum length is 19 characters.	Required	
High availability (HA) configuration	The SN 5428-2 can run in either *standalone* or *clustered* mode. The default is *clustered*. Standalone mode is recommended if the storage router is not intended to provide high availability along with other storage routers.	Required for SCSI routing only	Standalone or clustered
High availability (HA) cluster name	The name of the cluster in which the storage router is to participate. Clusters are multiple storage routers that back each other up in case of hardware or software failure. All storage routers that participate in a cluster must have the same cluster name.	Required only if *clustered* was specified for the HA configuration	
High availability (HA) IP address and subnet mask	The IP address and subnet mask of the storage router HA interface. The HA interface and management interface must be on unique IP networks. If the SN 5428-2 is to participate in a cluster, the HA IP address is required; if the SN 5428-2 is a stand-alone machine, it is optional. **Note** The HA interface for each storage router in a cluster must be on the same IP subnet.	Required only if *clustered* was specified for the HA configuration	
Primary DNS IP address	The IP address of the primary domain name server to be accessed by the storage router. Required if you refer to any other server via name rather than IP address.	Optional	
Secondary DNS IP address	A backup domain name server from which the storage router can request services when the primary DNS is unavailable.	Optional	

Table 2-1 First-Time Configuration Checklist (continued)

Configuration Item	Description	Required or Optional	Your Configuration Value
NTP server IP address	The IP address of the NTP server available to the storage router. This allows the storage router to keep the date and time synchronized with the rest of the network.	Optional	
Time zone, current date and time	The format for the date is mm/dd/yyyy, and the time is hh:mm:ss.	Optional	
Enable Telnet on all interfaces	Enable Telnet access on all interfaces. By default, Telnet access is enabled on only the management interface.	Optional	Yes or no
SNMP read community name	The name of the community having read-only access to the storage router network. The SN 5428-2 will respond to this community's GET commands. The default is *public*.	Optional	
SNMP write community name	The name of the community having write access to the storage router network. The SN 5428-2 will respond to this community's SET commands. The default is *private*.	Optional	
First SNMP trap manager IP address	The IP address of the first destination host used for SNMP notifications (traps). Required if you wish to use SNMP traps.	Optional	
Trap version for first SNMP IP address	The version number of the traps that are to be sent to the first SNMP trap manager IP address. The default is *1*.	Optional	
Second SNMP trap manager IP address	An optional IP address of the second destination host used for SNMP notifications (traps).	Optional	
Trap version for second SNMP IP address	The version number of the traps that are to be sent to the second SNMP trap manager IP address. The default is *1*.	Optional	
Send authentication failure option	Enable an authentication failure trap to be sent when a user specifies an incorrect community.	Optional	Yes or no
Send link up/down traps option	Enable link up/down traps to be sent for the Management interface when the link goes up and when it goes down.	Optional	Yes or no
	Enable link up/down traps to be sent for the HA interface when the link goes up and when it goes down.	Optional	Yes or no
	Enable link up/down traps to be sent for the Gigabit interface when the link goes up and when it goes down.	Optional	Yes or no
	Enable link up/down traps to be sent for the Fibre Channel interface when the link goes up and when it goes down.	Optional	Yes or no

Table 2-1 First-Time Configuration Checklist (continued)

Configuration Item	Description	Required or Optional	Your Configuration Value
Monitor-level password	A password for users who will only monitor storage router operations. The default password is *cisco*.	Optional	
Administrator-level password	A password for users who will configure and administer the storage router. The default password is *cisco*.	Optional	
Password applied to EIA/TIA-232 console interface	Choose whether or not the user is required to enter the monitor and administrator password when accessing the storage router via the EIA/TIA-232 console interface. The default is *no*.	Optional	Yes or no
Site-specific contact information for the SN 5428-2.system administrator	Name	Optional	
	E-mail Address	Optional	
	Phone number	Optional	
	Pager Number	Optional	
Name of SCSI routing instance	A unique name for a SCSI routing instance. Names of instances can be up to 32 characters in length. A maximum of 12 unique SCSI routing instances are allowed. Only one instance can be named in the setup configuration wizard. **Note** Do not name the SCSI routing instance with the setup configuration wizard if you are using the VLAN service with your SN 5428-2. See Chapter 4, "Configuring for VLAN," before naming and configuring SCSI routing instances.	Required for SCSI routing only	
Gigabit Ethernet interface and IP address and subnet mask	Associate the Gigabit Ethernet interface (*ge1* or *ge2*) and IP address to the SCSI routing instance. IP hosts access FC storage using this address.	Required for SCSI routing only	
Multiple or redundant Gigabit Ethernet interfaces, IP addresses and subnet masks	Configure multiple or redundant Gigabit Ethernet interfaces for the SCSI routing instance. IP hosts access FC storage using these addresses. For transparent SCSI routing, configure a maximum of one IP address per Gigabit Ethernet interface (multiple interfaces) or configure one IP address that can be presented on either interface (redundant interfaces). If you configure the Gigabit Ethernet interfaces (*ge1* and *ge2*) as redundant, they must be connected to the same network segment.	Required for transparent SCSI routing only	
FCIP instance name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.	Required for FCIP only	fcip2 or fcip2

Table 2-1 First-Time Configuration Checklist (continued)

Configuration Item	Description	Required or Optional	Your Configuration Value
IP address	A Gigabit Ethernet interface and IP address for the named FCIP instance, to provide IP connectivity between the FCIP instance and its peer destination.	Required for FCIP only	
Peer address	The IP address of the FCIP peer destination.	Required for FCIP only	
Protocol type	Protocol to assign to the FCIP peer destination, determined as follows: • If the peer is configured as a TCP client, assign protocol *tcpserver* • If the peer FCIP instance is configured as a TCP server, assign protocol *tcpclient*. • If the peer FCIP instance is configured to use raw IP, assign protocol *raw*	Required for FCIP only	
Domain ID	Set the domain IDs of the FCIP peers to different values, to avoid conflict.	Required for FCIP only	

Once you have completed the first-time configuration checklist, you are ready to continue with the first-time configuration of the SN 5428-2 Storage Router using the initial system configuration script and the setup configuration wizard.

Connecting a Console

To begin configuration of your SN 5428-2 Storage Router, use the CLI by connecting a PC with a terminal emulation program to the EIA/TIA-232 console interface according to the *Cisco SN 5428-2 Storage Router Hardware Installation Guide*. Then make sure that the terminal emulation program is configured for a CLI session with the values provided in Table 2-2.

Table 2-2 Terminal Emulation Configuration

Setting	Value
Bits Per Second	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Initial System Configuration Script

The initial system configuration script runs on the CLI and ensures that a few required values are entered to make the SN 5428-2 Storage Router operational. When you first power up the storage router and after the initial boot process, the script will run automatically on the CLI session running on the terminal emulation program via an EIA/TIA-232 console connection.

After the first running of the script, the script will run automatically whenever the storage router is not configured with an IP address for the management interface, due most likely to a **clear conf** command, which requires the system to be configured again.

The initial system configuration script provides explanatory text before prompting you to enter configuration values. There are two versions of the script. The values asked for by the script are determined by the configuration deployment option entered for the first prompt.

Table 2-3 lists the configuration items in the order they will appear in the script.

Table 2-3 Configuration Items in Initial System Configuration Script

Configuration Item	Configuration Deployment
Configuration deployment option: 1 for SCSI routing, 2 for transparent SCSI routing, 3 for FCIP	All
Static or dynamic deployment for transparent SCSI routing	Transparent SCSI routing
Management interface IP address and subnet mask in CIDR style (for example: 10.1.10.244/24)	All
(Optional) The destination IP address with subnet mask and then the gateway IP address. (for example 1.0.1.0/24 10.0.1.2)	All
SN 5428-2 system name (maximum length allowed is 19 characters)	All
HA configuration (standalone or clustered)	SCSI routing
Cluster name (asked for only when HA configuration is set to *clustered*)	SCSI routing
HA interface IP address and subnet mask in CIDR style (for example: 10.1.20.56/24; asked for only when HA configuration is set to *clustered*)	SCSI routing
Multiple or Redundant interfaces (configure a unique Gigabit Ethernet IP address for each interface, or configure a single Gigabit Ethernet interface that can be presented on either interface)	Transparent SCSI routing
Gigabit Ethernet IP address and subnet mask in CIDR style (for example: 10.1.0.45/24; for multiple interfaces, configure a maximum of one IP address per interface, or for redundant interfaces, configure one IP address that can be presented on either interface)	Transparent SCSI routing

When the script completes, the system will automatically reboot. When the command prompt returns, continue configuration with the setup configuration wizard.

Running the Setup Configuration Wizard

The setup configuration wizard is available from the CLI and is a script that consists of a series of prompts asking you to enter values to provide a basic system configuration for your SN 5428-2. You will be asked to enter values to configure the following:

- Management interfaces (including primary and secondary DNS servers)
- Date and time (including time zone and NTP server)
- Network management access (including SNMP)
- Management access (including passwords and system administrator contact information)
- SCSI routing (this section of the wizard only appears if SCSI routing was the configuration deployment selected in the initial system configuration script; if you are using the VLAN service, do not configure SCSI routing with the setup configuration wizard)
- FCIP (this section of the wizard only appears if FCIP was the configuration deployment selected in the initial system configuration script)

You can run the setup configuration wizard through an EIA/TIA-232 console interface connection, or through a Telnet session using the management interface.

The values entered for the setup configuration wizard are saved at the end of the wizard's script. To quit the configuration wizard at any time without saving changes, press **Ctrl-C**, and reboot the storage router to restore previous values.

Note The factory default listening port used for iSCSI traffic is *3260*. This is a port number assigned by IANA. You can change this value for your network configuration if needed. See the CLI **setup iscsi-port** command in Chapter 12, "Command Line Interface Reference," for details.

Use the following procedure to start the setup configuration wizard.

	Command	Description
Step 1	**enable**	Enter Administrator mode. If prompted for an Administrator password, use the default password, *cisco*. **Note** Passwords are cluster-wide configuration elements and apply to all storage routers in a cluster. If the SN 5428-2 joined an existing cluster during initial configuration, enter the Administrator mode password already configured for the cluster.
Step 2	**setup**	Start the setup configuration wizard. The wizard will ask you to choose one of the two levels: • The *novice* level provides information before the prompt explaining what is being requested. • The *expert* level does not provide the explanatory text. Respond to the prompts using your First-Time Configuration Checklist. • For multiple choice questions, the choices are shown in square brackets. • For values requiring a specific format, the required format is shown in square brackets. • If values have already been entered (for instance, via the initial system configuration script), the current value saved in the system are shown in square brackets. • Default values are shown in parentheses within the square brackets. • If you want to accept the current or default value, press **Enter**. • If there is no default and you want to bypass the question (that is, you do not want to change or provide a value), press **Enter**.

If you configured any interfaces or identified any servers to the SN 5428-2 that are outside the storage router management subnet, you must update the SN 5428-2 route table with the appropriate gateways that will provide access to these interfaces or servers, or configure the SN 5428-2 for RIP listening to dynamically learn IP routes. See Chapter 3, "Configuring System Parameters," for details on adding static IP routes or configuring the SN 5428-2 for RIP listening.

You can use the **setup** command again to change these basic configuration parameters. You can also use the CLI or, if the storage router is deployed for SCSI routing, the web-based GUI to make changes to the basic storage router configuration or to configure the storage router more extensively. To access the web-based GUI, point your browser to the SN 5428-2 management interface IP address.

Introducing the CLI

The CLI is available via a Telnet or Secure Shell (SSH) session to the management interface. It is also available via a direct EIA/TIA-232 connection on the console interface. The CLI provides commands to perform all necessary SN 5428-2 management functions, including software upgrades and maintenance.

All CLI commands are capable of prompting for further information as the user types.

- Pressing the Tab key completes the current command word at any point after it is unique.
- Pressing the question mark (?) key lists all of the options available at that point in the command syntax.
- Each command or keyword can be truncated at any point after it is unique.

Character Case Sensitivity in the CLI

CLI commands, keywords, and reserved words are not case-sensitive. Commands and keywords can be entered in upper and lower case.

User-defined text strings are case-sensitive and can be defined in both upper and lower case (including mixed cases). Case for user-defined text strings is preserved in the configuration.

Command Modes

The SN 5428-2 management interface is password protected. You must enter passwords when accessing the SN 5428-2 via Telnet or SSH (for the CLI) or web-based GUI.

There are two levels of authority:

- Monitor mode—Allows view-only access to the SN 5428-2 status and system configuration information.
- Administrator mode—Allows the user to configure and actively manage the SN 5428-2, its access lists and SCSI routing instances, and the storage router cluster.

The factory default password for both modes is *cisco*.

Passwords for Monitor and Administrator mode can be initially configured through the setup configuration wizard. See the "Running the Setup Configuration Wizard" section on page 2-8 for details.

Note Passwords are shared cluster-wide, and when configured on the first storage router in the cluster, will be shared with any other storage router that joins the cluster.

Command Prompt

The CLI command prompt includes the SN 5428-2 system name. An asterisk (*) appears at the beginning of the prompt if the system configuration has been modified but not saved.

Reserved Words

Reserved words cannot be used as user-defined values or names in CLI commands. Words that are used as commands or as keywords in commands are reserved words.

The following are additional reserved words in the CLI.

- acl
- canonical
- iprouter
- iptan
- loglevel

Show CLI Command

Use the **show cli** command to display the complete CLI command syntax tree, along with helpful information about command parameters and arguments. Only valid commands will display for the current command mode of your SN 5428-2 management session.

You can limit the display to specific command families by specifying the desired command words as parameters to the **show cli** command. For example, **show cli aaa debug scsirouter** displays the syntax tree for all *aaa* commands, all *debug* commands, and all *scsirouter* commands.

Special Keys

The CLI supports the use of special keyboard keys. Table 2-4 lists the special keys and describes their function.

Table 2-4 Special Keys

Key	Function
?	List choices
Backspace	Delete character backwards
Tab	Command word completion
Ctrl-A	Go to the beginning of the line
Ctrl-B or Left Arrow	Go backwards one character
Ctrl-D	Delete current character
Ctrl-E	Go to the end of the line
Ctrl-F or Right Arrow	Go forward one character
Ctrl-K	Delete from current position to the end of the line
Ctrl-N or Down Arrow	Go to the next line in the history buffer
Ctrl-P or Up Arrow	Go to the previous line in the history buffer
Ctrl-T	Transpose the current and previous character
Ctrl-U	Delete the line
Ctrl-W	Delete the previous word

Starting a CLI Management Session

Follow these steps to start a CLI management session via a Telnet connection to the storage router.

Step 1 Establish a Telnet session to the SN 5428-2.

Step 2 Enter the appropriate password at the logon prompt.

Step 3 (Optional) Enter **enable** to change to Administrator mode.

Note If you need to make changes to the configuration of the storage router, you need to enable the Administrator mode.

Step 4 (Optional) Enter the Administrator password at the prompt.

Step 5 Issue the appropriate CLI commands to complete the desired task.

Introducing the Web-Based GUI

If the SN 5428-2 is deployed for SCSI routing, you can also configure the SN 5428-2 Storage Router using the web-based GUI. You can use the GUI for configuration after completing the initial system configuration script, which assures that the SN 5428-2 management interface is configured with an IP address.

To access the GUI, enter the URL for the SN 5428-2 by pointing your browser to the SN 5428-2 management interface IP address using the HTTP protocol (for example, type **http://10.1.10.244**).

Logging In

After entering the URL for the SN 5428-2, a login page appears. You can log in as *monitor* or as *admin*, entering the appropriate user name and password in the dialog box that appears. See Table 2-5 for the user name and factory default password to use for the two login options.

Table 2-5 Logging into Web-Based GUI

Login Options	User Name	Factory Default Password
Monitor	monitor	cisco
Admin	admin	cisco

Note If you configured new passwords using the setup wizard, or if the SN 5428-2 joined an existing cluster with different passwords, use them when logging in.

Monitor Mode

Monitor mode in the web-based GUI will only allow you to monitor the storage router. You cannot configure, maintain, or troubleshoot the storage router in monitor mode. If you click on the Configuration, Maintenance, and Troubleshooting menu items in the GUI, a login dialog box will appear asking for a user name and password for administrator mode.

Administrator Mode

In administrator mode, you can configure, maintain, and troubleshoot the storage router. If you click the Monitor menu item, a login dialog box will appear asking for a user name and password for monitor mode.

Menu Items and Links

The GUI menu links appear horizontally at the top of each browser page. Click the desired menu item to display a list of available action links in the left frame. Table 2-6 lists the menu links, available actions, and the login modes from which they are available.

Table 2-6 Menu Items and Links in the GUI

Menu Links	Actions	Login Mode
Monitor	Display configuration information and operational statistics for the SN 5428-2 system, all interfaces, services (including cluster and SCSI routing instances, or FCIP instances), and the IP network.	Monitor only
Configuration	Configure system parameters (including interface IP addresses and operational parameters, FC zoning, and authentication), static routes, and SCSI routing instances or FCIP instances.	Admin only
Maintenance	Perform software upgrades, backup and restore SN 5428-2 configuration elements, and reset the system.	Admin only
Troubleshooting	Perform reset actions on log files and counters, display configuration information and system data, perform trace and debug functions, display debug files, and gather information when requested by Cisco Technical Support professionals.	Admin only
Support	Opens the Cisco.com “Service & Support” page in a new browser window.	Monitor and Admin
Home	Returns to the GUI login page where you choose to log in as either Monitor or Admin.	Monitor and Admin
Help	Opens the GUI online help in a new browser window.	Monitor and Admin

Where to Go Next

Note If you want to configure a high availability cluster, or add the storage router to an existing cluster, review the information and procedures in Chapter 10, "Configuring a High Availability Cluster," before configuring additional system parameters or SCSI routing.

If you did not run the complete SN 5428-2 setup configuration wizard, or if you want to make system configuration additions, changes, or corrections, continue with the procedures described in Chapter 3, "Configuring System Parameters."

If you are using the VLAN service with the storage router and you entered all desired parameters—except for SCSI routing—with the setup configuration wizard (see "Running the Setup Configuration Wizard" section on page 2-8 for details), configure for VLAN using the procedures described in Chapter 4, "Configuring for VLAN."

If you are participating in Fibre Channel switched fabric zoning with the storage router, configure for zoning using the procedures described in Chapter 5, "Configuring Fibre Channel Interfaces."

If you do not need to configure for VLAN or zoning, go directly to Chapter 6, "Configuring SCSI Routing," to configure SCSI routing more extensively or Chapter 7, "Configuring Transparent SCSI Routing," to verify the configuration of an SN 5428-2 deployed for transparent SCSI routing.

If you need to configure FCIP, go to Chapter 8, "Configuring FCIP."

CHAPTER 3

Configuring System Parameters

This chapter explains how to configure system parameters on your SN 5428-2 Storage Router and contains the following sections:

- Prerequisite Tasks, page 3-1
- Configuration Tasks, page 3-2
- Configuring the Management Interface, page 3-3
- Configuring Time and Date, page 3-4
- Configuring IP Routes, page 3-5
- Configuring Network Management Access, page 3-7
- Configuring Passwords, page 3-8
- Configuring Administrator Contact Information, page 3-8
- Configuring the High-Availability Interface, page 3-9
- Configuring for Secure Shell (SSH) Access, page 3-9
- Verifying and Saving Configuration, page 3-10

System parameters can be configured or changed using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Prerequisite Tasks

Before configuring system parameters, make sure you have finished the following tasks:

- Completed the hardware installation according to the *Cisco SN 5428-2 Storage Router Hardware Installation Guide.*
- Entered values as requested by the initial system configuration script. See the "Initial System Configuration Script" section on page 2-7 for more information.

Note You do not need to perform the configuration tasks in this chapter if you ran the complete SN 5428-2 setup configuration wizard (using the **setup** CLI command with no keyword), or if you ran the wizards separately using all the **setup** CLI commands except **setup scsi**. However, you may wish to perform some of the optional configuration procedures described in this chapter, such as configuring IP routes or SSH access.

Configuration Tasks

To configure system parameters on your SN 5428-2 Storage Router, perform the following steps:

Step 1 Configure the management interface.

Step 2 Configure the time and date.

Step 3 (Optional) Configure IP routes.

Step 4 (Optional) Configure network management access.

Step 5 Configure passwords.

Step 6 (Optional) Configure administrator contact information.

Step 7 (Optional) Configure the high-availability (HA) interface.

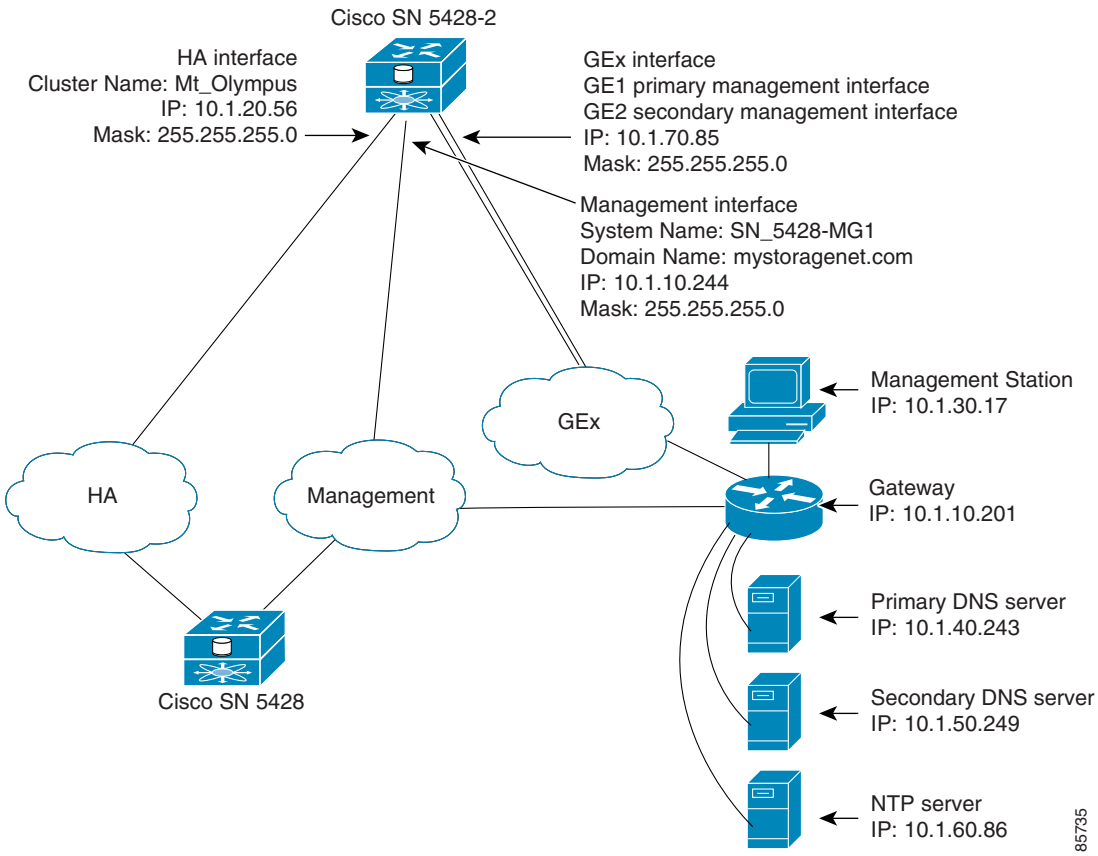
Step 8 (Optional) Configure for Secure Shell (SSH) access.

Step 9 Verify and save configuration.

Note You can verify and save the configuration (by using the **save system bootconfig** or **save all bootconfig** command) at any point in the process of performing the configuration tasks.

Figure 3-1 illustrates the example configuration used in this chapter.

Figure 3-1 System Parameters Example Configuration



Configuring the Management Interface

Configuring the management interface consists of tasks for setting the system name, IP address and mask, gateway, and DNS servers. Use the following procedure to configure the management interface.

If you want external servers, such as RADIUS, TACACS+ or SMTP servers, to communicate with the SN 5428-2 Storage Router via a specific IP address on a Gigabit Ethernet interface (for in-band management), configure the IP address on the desired Gigabit Ethernet interface, as described in Step 4. Save the changes to the bootable configuration (**save all bootconfig**), and then reboot the storage router.

Note The purpose of Figure 3-1 is an example system configuration only. The IP addresses and all names given below are examples only.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**hostname** *SN_5428-2-MG1*	Specify or change the system name. The system name identifies the SN 5428-2 through the management interface and appears immediately in the prompt.

	Command	Description
Step 3	**interface mgmt ip-address** *10.1.10.244/24*	Specify or change the IP address and subnet mask for the management interface. **Note** If this storage router is to participate in a cluster, the management interface for all storage routers in the cluster must be on the same IP subnet.
Step 4	**interface** *ge1* **ip-address** *10.1.70.85/24* **secondary** *ge2*	(Optional) Configure an IP address and subnet mask on *ge1* to be used for SN 5428-2 management and maintenance. Specify *ge2* as the secondary interface for this IP address. If the Gigabit Ethernet interface *ge1* becomes unavailable and *ge2* is available, the IP address will become active on *ge2*. **Note** If you configure a Gigabit Ethernet IP address with a secondary interface, all Gigabit Ethernet IP addresses on the same subnet must also be configured with the same secondary interface.
Step 5	**no restrict** *ge1* **ssh** **no restrict** *ge2* **ssh**	(Optional) Configure the Gigabit Ethernet interfaces to be used for management and maintenance for access via the desired protocol(s). In this configuration example, management access to the SN 5428-2 through the configured Gigabit Ethernet IP address is allowed for both *ge1* and *ge2* via Secure Shell (SSH) protocols.
Step 6	**ip name-server** *10.1.40.243 10.1.50.249*	(Optional) Set the primary and secondary DNS IP addresses. Specifies the IP address of the primary DNS server if the management interface IP address is to be correlated with a DNS host name. If there is a secondary DNS, the second IP address specifies the IP address of the secondary DNS server.
Step 7	**ip domain-name** *mystoragenet.com*	(Optional) Specify the domain name of the storage router. Use this command in conjunction with the **ip name-server** command.

Configuring Time and Date

Configuring time and date parameters consists of specifying the time zone, time, date and time server. Use the following procedure to configure the time and date parameters.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**clock timezone** *US/Pacific*	Identify the time zone where the storage router is located. If a time zone is not identified, time is assumed to be GMT. **Note** To use the **clock timezone** command, you must use a valid time-zone string. For a list of valid time-zone strings, use the **clock timezone ?** command. See Chapter 12, "Command Line Interface Reference," for details.

	Command	Description
Step 3	**clock set** *08:20:00 04 15 2002*	Set time and date (for example: time, 8:20 A.M.; date, April 15, 2002).
Step 4	**ntp peer** *10.1.60.86*	(Optional) Specify the name or IP address of the network time protocol (NTP) server with which the storage router will synchronize the date and time.

Configuring IP Routes

If the storage router requires access to any IP address outside the management subnet, you must configure the appropriate routes in the SN 5428-2 routing table. You can configure static routes, or if you are using RIP in your network, you can enable the storage router to dynamically learn routes using the routing information protocol (RIP).

When there are multiple routes to the same destination, use administrative distance to determine which route to install in the routing table. The default administrative distance for static routes is 1; the administrative distance for dynamic routes created by RIP is 120. The route with the lower administrative distance is installed in the routing table (as long as the interface used by the route is up).

Note The SN 5428-2 can learn a maximum of 200 routes. Additional routes that are received are silently ignored. In the SN 5428-2 routing table, a static route will always override a learned route. To modify this behavior, change the administrative distance of a static route to a value greater than 120.

Static Routes

Use the following procedure to manually configure the SN 5428-2 routing table using static IP routes.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**ip route** *10.1.30.0/24 10.1.10.201*	(Optional) Configure a gateway IP address if the storage router is to be managed from a management station outside the storage router management subnet. The second IP address specifies a gateway on the storage router management network that will provide access to a management station. **Note** In this configuration example, the mask is set to 24 (255.255.255.0) to allow any host on subnet 10.1.30.0 to be a management station.
Step 3	**ip route** *10.1.40.243/32 10.1.10.201 130*	Configure a gateway IP address if the primary DNS server is outside the storage router management subnet. The second IP address specifies a gateway on the storage router management network that will provide access to a primary DNS server. The administrative distance is set at *130*, so if RIP is enabled, the route can be overridden by a dynamically learned route. **Note** In this configuration example, the mask is set to 32 (255.255.255.255) to specify the host with IP address 10.1.40.243 (the primary DNS server).

	Command	Description
Step 4	**ip route** *10.1.50.249/32 10.1.10.201*	Configure a gateway IP address if the secondary DNS server is outside the storage router management subnet. The second IP address specifies a gateway on the storage router management network that will provide access to a secondary DNS server. **Note** In this configuration example, the mask is set to 32 (255.255.255.255) to specify the host with IP address 10.1.50.249 (the secondary DNS server).
Step 5	**ip route** *10.1.60.86/32 10.1.10.201*	Specify the gateway IP address if the time server is outside the storage router management subnet. The second IP address specifies the gateway on the storage router management network that provides access to the time server. **Note** In this configuration example, the mask is set to 32 (255.255.255.255) to specify the host with IP address 10.1.60.86.

Dynamic Routes via RIP Listening

Use the following procedure to configure the storage router to learn routes from RIP advertisements, and dynamically populate the routing table. The storage router supports both RIP version 1 (v1) and RIP version 2 (v2).

The SN 5428-2 RIP implementation runs RIP v2 in broadcast mode. This allows the storage router to learn from either RIP v1 or RIP v2 hosts that are operating in broadcast mode. The storage router will not learn routes from RIP v2 hosts operating in multicast mode.

Note The storage router is a passive, or silent, RIP device; it updates routes based on RIP advertisements but it does not advertise.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**ip rip enable**	Enable RIP listening. The storage router listens for advertised routes, learning routing information dynamically as it is exchanged in the network.

Configuring Network Management Access

Configuring network management access consists of tasks for configuring SNMP. Use the following procedure to configure SNMP for network management access.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**no restrict all telnet**	(Optional) Enable Telnet access on all interfaces. By default, Telnet access is enabled on only the management interface.
Step 3	**snmp-server community** *world* **ro**	(Optional) Specify the name of the community having read-only access of the storage router network (that is, to which community's GET commands the storage router will respond). The default read community is *public*.
Step 4	**snmp-server community** *mynetmanagers* **rw**	(Optional) Specify the name of the community having write access to the storage router network (that is, to which community's SET commands the storage router will respond). The default write community is *private*.
Step 5	**snmp-server host** *10.1.30.17* **version** *2* **traps**	Specify the IP address for the first destination host used for a specified version of notifications (traps). Version 1 traps is the default version. **Note** In this configuration example, the trap hosts have IP addresses that are outside the storage router management subnet. In an earlier step in the Configuring the Management Interface section, a gateway was already specified providing access to hosts on the 10.1.30.0 subnet.
Step 6	**snmp-server host** *10.1.30.18* **traps**	(Optional) Specify the IP address for the second destination host used for notifications (traps). Version 1 traps is the default version.
Step 7	**snmp-server sendauthtraps**	(Optional) Enable sending of authentication failure traps.
Step 8	**no snmp-server linkupdown all**	(Optional) By default, the SNMP agent is enabled to generate link up/down traps for all interfaces. In this configuration example, the command disables this setting for all interfaces. See Chapter 12, "Command Line Interface Reference," to disable this setting for individual interfaces.

Configuring Passwords

Configuring passwords consists of setting the Monitor mode and Administrator mode passwords for access to the 10/100 Ethernet management interface (used for the CLI via Telnet or SSH, and the web-based GUI via HTTP). You can also enable these passwords to restrict access to the EIA/TIA-232 console interface. The factory default password for both Monitor and Administrator modes is *cisco*.

In a cluster environment, passwords are cluster-wide configuration elements and apply to all storage routers in a cluster. All password management functions are handled by a single storage router. If you issue try to set the Administrator or Monitor mode passwords from a storage router that is not performing password management functions, the CLI displays an informational message with the name of the storage router that is currently handling those functions.

Use the following procedure to configure passwords

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**monitor password** *janu$01*	Set the monitor password (for users who only monitor storage router operation).
Step 3	**admin password** *electr@50*	Set the administrator password (for system administrators, allowing configuration changes).
Step 4	**restrict console**	(Optional) Enable the Monitor-mode and Administrator-mode passwords to be required when accessing the SN 5428-2 via a console connected to the EIA/TIA-232 console interface.

Configuring Administrator Contact Information

Configuring administrator contact information consists of tasks for specifying the name, e-mail address, phone number, and pager number of the system administrator for the storage router. Use the following procedure to configure administrator contact information.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**admin contactinfo name** *"Pat J. Smith"* **email** *pjsmith@mystoragenet.com* **phone** *"763 555-1117"* **pager** *"763 555-7766"*	Provide contact name, e-mail address, phone number, and pager number. Enclose each string that contain spaces in single or double quotes. **Note** The **admin contactinfo** command requires that you specify either one parameter or all four parameters.

Configuring the High-Availability Interface

If you configured the SN 5428-2 for high availability during the initial system configuration, you were prompted to enter an IP address for the high availability (HA) interface. The HA interface is a 10/100 Ethernet interface, and is used along with the management interface to exchange information as heartbeats to detect changes or failures in the cluster.

If you configured the SN 5428-2 as a stand-alone system, or if you need to change the HA IP address without changing clusters, use the following procedure to configure the HA interface IP address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**interface ha ip-address** *10.1.20.56/24*	Specify or change the IP address and subnet mask for the HA interface.

See Chapter 10, "Configuring a High Availability Cluster," for more information about configuring SN 5428-2s in a high availability cluster.

Configuring for Secure Shell (SSH) Access

The SN 5428-2 Storage Router supports Secure Shell (SSH) as an alternative to Telnet protocol for SN 5428-2 management. SSH provides encryption and strong authentication for interactive SN 5428-2 management sessions. The SN 5428-2 supports SSH protocol version 2 and allows port forwarding.

The SN 5428-2 SSH implementation supports execution of interactive commands only; non-interactive commands cannot be executed. Secure FTP (sftp) and Secure Copy (scp) are not supported.

SSH is enabled for the SN 5428-2 and the SSH service is started, by default. However, you must generate a public/private key pair for the SN 5428-2 before you can use SSH to establish a management session. By default, SSH is restricted on all interfaces except the management interface.

Use the following procedure to configure the SN 5428-2 to use SSH.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show ssh**	Display the status of the SSH service for the SN 5428-2. The SSH service is running and is enabled by default (Example 3-1).
Step 3	**ssh enable**	(Optional) If SSH is not enabled, start the SSH service.
Step 4	**ssh keygen**	Generate the SSH public/private key pair, using the specified number of bits. For example, generate a 1024-bit key pair (the default setting).
Step 5	**show restrict**	Display the current protocol restrictions for the SN 5428-2. Verify that SSH is enabled for the required interface.
Step 6	**no restrict** *mgmt* **ssh**	(Optional) Enable SSH for the required interfaces. For example, enable SSH for the SN 5428-2 the management interface.

	Command	Description
Step 7	**restrict** *mgmt* **telnet**	(Optional) If SSH is being used as a replacement for Telnet, you can disable Telnet access through the specified SN 5428-2 interface (or all interfaces). For example, disable Telnet access via the management interface.
Step 8	**no telnet enable**	(Optional) You can also disable Telnet for the entire SN 5428-2 by stopping the Telnet service.
Step 9	**save system bootconfig**	Save changes to the SN 5428-2 bootable configuration.

Example 3-1 Results of "show ssh" Command

```
[SN5428-2A]# show ssh

SSH Server Configuration

               Status: enabled
```

Verifying and Saving Configuration

Verify the system parameters using the following procedure. You can save the configuration at any time using either the **save all bootconfig** commands. You must save the running configuration to the bootable configuration for it to be retained in the storage router when it is rebooted.

Use the following procedure to verify configuration information.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show system**	Display system information, such as system name, software version, date and time (including time zone), NTP server, DNS (name server), and management and HA interface IP addresses.
Step 3	**show ip route**	(Optional) Display the system route table, if you added any routing information or if you enabled the storage router for RIP listening.
Step 4	**show ip rip**	(Optional) Display RIP configuration and operational information, if set.
Step 5	**show snmp**	(Optional) Display SNMP management configuration information for the storage router, if set.
Step 6	**show admin**	(Optional) Display contact information for the system administrator of the storage router, if set.
Step 7	**show ssh**	(Optional) Display SSH operational status, if configured.
Step 8	**show ssh fingerprint**	(Optional) Display public key information for the SSH, if set.
Step 9	**show restrict**	(Optional) Display the restrict settings, if you made changes to the protocols allowed for the various SN 5428-2 interfaces.
Step 10	**show bootconfig**	(Optional) Display the current boot configuration of the SN 5428-2.
Step 11	**show runningconfig**	(Optional) Display the current running configuration of the SN 5428-2.

CHAPTER 4

Configuring for VLAN

This chapter explains how to configure your SN 5428-2 Storage Router for a virtual local area network (VLAN) and contains the following sections:

- Prerequisite Tasks, page 4-1
- VLAN Encapsulation, page 4-1
- Configuration Tasks, page 4-2
- Configuring for VLAN with VTP, page 4-4
- Configuring for VLAN without VTP, page 4-4
- Configuring an IP Route, page 4-5
- Verifying and Saving Configuration, page 4-5
- Assigning a VLAN to a SCSI Routing Instance, page 4-6

You can configure for VLAN using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Note The VLAN function is not available for SN 5428-2 Storage Routers deployed for FCIP.

Prerequisite Tasks

Before configuring for VLAN, make sure you have configured all system parameters as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters."

VLAN Encapsulation

The SN 5428-2 Storage Router uses the IEEE 802.1Q standard for VLAN encapsulation.

Note If the storage router is connected to a Cisco switch, the switch port must be configured as a trunk port and the encapsulation set to 802.1Q, not Inter-Switch Link (ISL), which is the default setting for trunk ports. The switch port must also be set to VLAN 1.

Configuration Tasks

VLAN and VTP configuration information applies to all storage routers participating in a cluster. When the configuration information is saved, the settings become active on all storage routers in the cluster.

Note Changes to cluster-wide configuration elements are handled by a single storage router in the cluster. In a cluster environment, use the **show cluster** command to verify that the SN 5428-2 that you are configuring is managing cluster-wide configuration elements.

To configure for VLAN on the SN 5428-2 Storage Router, perform the following steps:

Step 1 Configure for VLAN using the VLAN Trunking Protocol (VTP).

or

Configure for VLAN without using VTP.

Step 2 Configure an IP route.

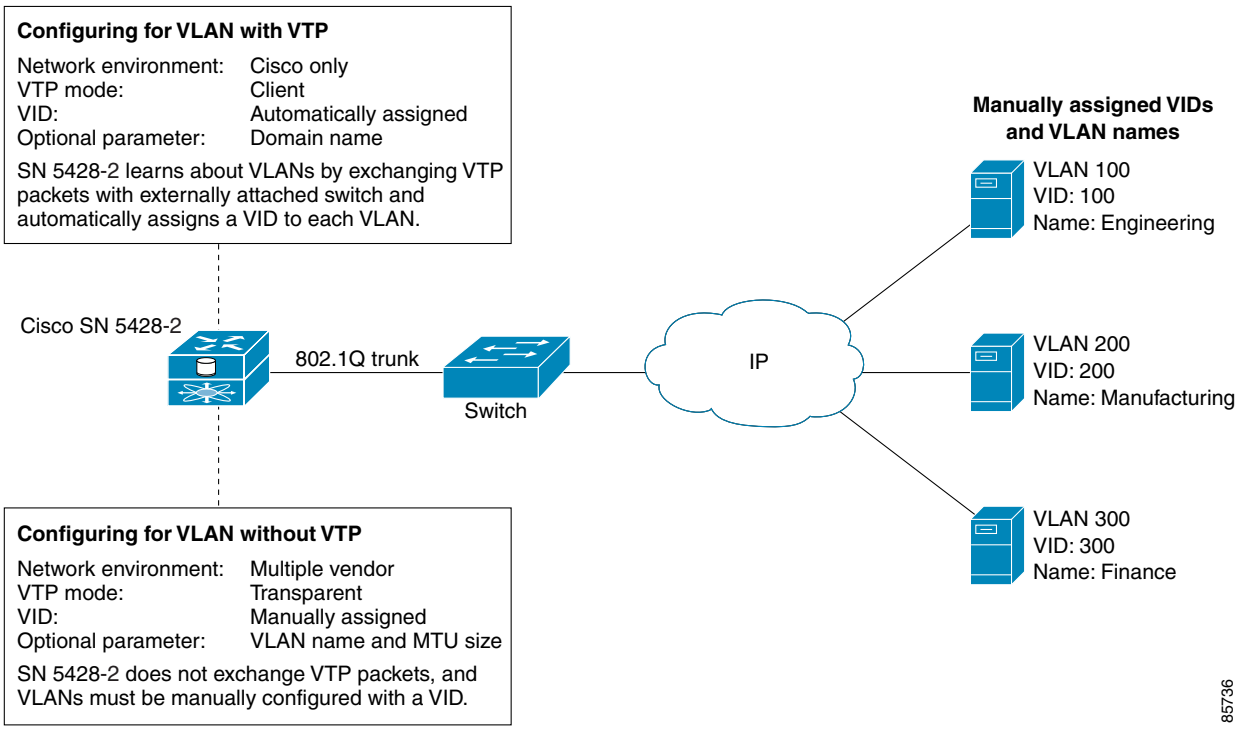
Step 3 Verify and save configuration.

Note You can verify and save the configuration at any point in the process of performing the configuration tasks. Save your configuration by using the **save all bootconfig** CLI command. This command saves all configuration data to the bootable configuration, which is then used when the storage router is rebooted.

Step 4 Proceed to Chapter 6, “Configuring SCSI Routing,” to configure SCSI routing and to assign a VLAN to a SCSI routing instance.

Figure 4-1 contrasts configuring the SN 5428-2 Storage Router for VLAN with VTP and without VTP.

Figure 4-1 Contrast of Configuring for VLAN with VTP and without VTP


Configuring for VLAN with VTP
Network environment: Cisco only
VTP mode: Client
VID: Automatically assigned
Optional parameter: Domain name
SN 5428-2 learns about VLANs by exchanging VTP packets with externally attached switch and automatically assigns a VID to each VLAN.
Manually assigned VIDs and VLAN names
VLAN 100
VID: 100
Name: Engineering
Cisco SN 5428-2
802.1Q trunk
Switch
IP
VLAN 200
VID: 200
Name: Manufacturing
VLAN 300
VID: 300
Name: Finance
Configuring for VLAN without VTP
Network environment: Multiple vendor
VTP mode: Transparent
VID: Manually assigned
Optional parameter: VLAN name and MTU size
SN 5428-2 does not exchange VTP packets, and VLANs must be manually configured with a VID.
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Configuring for VLAN with VTP

Configuring for VLAN using the VLAN Trunking Protocol (VTP) consists of assigning the VTP domain name and setting the VTP mode to client. VTP, a proprietary protocol of Cisco Systems, is used to propagate VLAN information around a switched network.

Use the following procedure to configure VLAN using VTP.

Note VTP can only be used in a Cisco network environment.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**vtp domain** *opus*	(Optional) Assign a VTP domain name (*opus*) to which the SN 5428-2 Storage Router belongs. If a domain name is not specified, the SN 5428-2 will assign itself to the first domain from which it receives a VTP message. The default setting is *none*.
Step 3	**vtp mode client**	The default setting for the VTP mode is *client*. Set the VTP mode to *client* if the current setting is *transparent*. In client mode, the SN 5428-2 will exchange VTP packets with an externally attached switch to learn about the VLANs that are accessible in the network.

Configuring for VLAN without VTP

Configuring for VLAN without using VTP consists of setting the VTP mode to transparent, assigning a VID, and optionally assigning a name and maximum transmission unit (MTU) size to the VLAN.

Use the following procedure to configure VLAN without using VTP.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**vtp mode transparent**	Set the VTP mode for the storage router to *transparent*. In transparent mode, the SN 5428-2 does not exchange VTP packets, and VLANs must be manually configured. The default setting is *client*.
Step 3	**vlan** *100* or **vlan** *100* **name** *Engineering* **mtusize** *9000*	Assign a VLAN identifier (VID) number that uniquely identifies the VLAN. The VID can be any integer from 1 to 4095. Optionally, a VLAN can be assigned a unique name (*Engineering*) up to 32 characters in length. If a name is not specified, a default name is automatically assigned. The default name has *VLAN* as the prefix followed by the VID, left padded to four bytes (for example, VLAN0100). Optionally, an MTU size can be specified using a value from 1500 to 9000. The default value is 1500.

Configuring an IP Route

Note If the SN 5428-2 is configured to dynamically learn routes via RIP listening, you do not need to configure a static IP route.

Configuring an IP route to access the VLAN consists of specifying a static route that uses a gateway attached to the desired VLAN. Use the following procedure to configure an IP route.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**ip route** *10.2.90.285/32 10.2.10.233*	Specify the IP address and subnet mask (*10.2.90.285/32*) of the destination. Set the subnet mask to 255.255.255.255. In this example, the subnet mask was set using CIDR style (*/32*).

Verifying and Saving Configuration

Verify VTP and VLAN operational and configuration information using the procedures that follow. You can save the configuration at any time by using the **save all bootconfig** command. You must save the running configuration to the bootable configuration for it to be retained in the storage router when it is rebooted. Once you have saved the configuration, you can verify that the configuration to be used when the storage router is rebooted matches the currently running configuration.

Use the following procedure to verify VTP operational information and configured settings.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show vtp**	Display VTP operational information (Example 4-1).
Step 3	**show vtp from runningconfig** or **show vtp from bootconfig**	Display current VTP configuration from the currently running configuration (runningconfig) or from the persistent saved configuration, used when the storage router is restarted (bootconfig). (See Example 4-2.)

Example 4-1 Verifying VTP Operational Information

```
[SN5428-2A]# show vtp
Configuration Revision    :  8
Number of existing VLANs  :  4
VTP Operating Mode        :  Client
VTP Domain Name           :  opus
```

Example 4-2 Verifying VTP Configured Settings

```
[SN5428-2A]#  show vtp from runningconfig
vtp mode client
vtp domain opus
```

Use the following procedure to verify current operational information for all VLANs either learned from the network using VTP in client mode or configured locally while in transparent mode.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show vlan**	Display current VLAN operational information (Example 4-3).

Example 4-3 Verifying VLAN Operational Information

```
[SN5428-2A]# show vlan
VLAN  Name                            Status     Ports
----  ------------------------------  ---------  --------------------------------
100   Engineering                     active     ge2
200   Manufacturing                   active     ge2

VLAN  Type   MTU    Interfaces
----  -----  -----  --------------------------------
100   enet   1500   ge2VLAN100
200   enet   1500   ge2VLAN200
```

Use the following procedure to verify configured VLAN information.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show vlan from runningconfig** or **show vlan from bootconfig**	Display current VLAN configuration from the currently running configuration (runningconfig) or from the persistent saved configuration, used when the storage router is restarted (bootconfig). (See Example 4-4.)

Example 4-4 Verifying VLAN Configuration Information

```
[SN5428-2A]# show vlan from runningconfig
vlan 100 name Engineering mtu 1500
vlan 200 name Manufacturing mtu 1500
```

Assigning a VLAN to a SCSI Routing Instance

Assigning a VLAN to a SCSI routing instance is achieved with the **scsirouter serverif vlan** command. This procedure is provided in the "Configuring a Server Interface" section of Chapter 6, "Configuring SCSI Routing." We recommend that you follow the configuration tasks to configure SCSI routing in the order given in that chapter at the time you are ready to configure SCSI routing.

CHAPTER 5

Configuring Fibre Channel Interfaces

This chapter explains how to configure your SN 5428-2 Storage Router Fibre Channel (FC) interfaces. This includes configuring zoning, and contains the following sections:

- Prerequisite Tasks, page 5-1
- Configuration Tasks, page 5-1
- Configuring FC Interfaces, page 5-2
- Configuring the Domain ID, page 5-4
- Configuring Zoning, page 5-6
- Verifying Configuration, page 5-9

You can configure FC interfaces and zoning using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Prerequisite Tasks

Before configuring FC interfaces or zoning, make sure you have configured all system parameters as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters."

Configuration Tasks

To configure the SN 5428-2 for zoning, perform the following steps:

Step 1 Configure the FC interfaces.

Step 2 Configure the domain ID.

Step 3 Create a zone set and zone, and an optional alias.

Step 4 Add the zone to the zone set.

Step 5 Add members to the zone, and optionally, members to the alias.

Step 6 Activate the zone set.

Step 7 Verify configuration.

Configuring FC Interfaces

The SN 5428-2 has an integrated switch component with Fibre Channel interfaces (fc1 through fc8) that support the port types described in Table 5-1. The SN 5428-2 FC interfaces are auto configuring; for public devices and other switches, the SN 5428-2 can automatically set the port mode as each interface discovers the type of device to which it is connected.

Table 5-1 FC Port Types

Type	Description	Configuration
E_Port	Operates as an expansion port when connected to another SN 5428-2 or an FC-SW-2 compliant switch. Links multiple FC switches together into a fabric.	Self-discovered by configuring a G_Port or GL_Port.
F_Port	Port type is fabric. Supports connection to a single public device (N_Port).	Configured with the **interface** *fc?* **type** command, or self-discovered by configuring a G_Port or GL_Port.
FL_Port	Port type is fabric loop (also known as "public loop"). Supports connection to a loop of up to 126 public devices (NL_Port).	Configured with the **interface** *fc?* **type** command, or self-discovered by configuring a GL_Port.
G_Port	Port type is generic and can function as either an F_Port or an E_Port. Self-discovers as an F_Port when connected to a single public device, or as an E_Port when connected to another SN 5428-2 or an FC-SW-2 compliant switch. May also self-discover as an E_Port when connected to a switch running non-FC-SW-2 compliant firmware.	Configured with the **interface** *fc?* **type** command.
GL_Port	Port type is generic loop; this is the default port type. Self-discovers as an FL_Port when connected to a loop of public devices, an F_Port when connected to a single device, or an E_Port when connected to another SN 5428-2 or an FC-SW-2 compliant switch. May also self-discover as an E_Port when connected to a switch running non-FC-SW-2 compliant firmware.	Configured with the **interface** *fc?* **type** command.
TL_Port	Port type is translated loop. Supports connection to a loop of up to 126 private devices with the ability to communicate with "off-loop" devices, such as public fabric devices and private devices on other TL_Ports. TL_Ports connect to devices that confirm to the Fibre Channel-Private Loop SCSI Direct Attach (FC-PLDA) standard. A TL_Port acts as a proxy for the off-loop device, translating private frames to and from public frames. Each TL_Port can proxy up to 64 off-loop devices.	Configured with the **interface** *fc?* **type tl-port mode** command**.**
Donor	Enables the SN 5428-2 to extend buffer credits from the donor port to selected FC ports.	Configured with the **interface** *fc?* **type donor** command.

The following are the default operational characteristics for the FC interfaces:

- Fairness disabled (switch has priority)
- Fabric Address Notification (FAN) enabled
- Automatically negotiated transfer rate (linkspeed auto)
- Multi-Frame sequence bundling enabled (with a timeout value of 10)

- GS-3 management server commands enabled
- Port type of generic loop, which enables automatic selection of port type as Fabric (F_Port), Fabric Loop (FL_Port or public loop) or Expansion (E_Port or switch to switch)
- Credit extension is not enabled (ext-credit is 0)

Configuring an FC Port Type

To configure an FC port type, select the appropriate port type based on the connected equipment, as described in Table 5-1 on page 5-2.

Note If you are going to attach to a Fibre Channel fabric through an inter-switch link or by connecting to another SN 5428-2, verify that the named interface port type is set to generic loop (GL_Port), using the **show interface** command. If it is not, you must change the FC interface port type to GL_Port and reset the interface, as shown in the following procedure.

Use the following procedure to configure and reset a port type for an FC interface. Resetting the port type ensures that the port is configured correctly with the connected equipment. In this example, *fc3* is the interface that is connected to your Fibre Channel switched fabric, and it is being set to port type *gl-port.*

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**interface** *fc3* **type** *gl-port*	Specify the port type to be used for the specified port. See the **interface fc? type** command in Chapter 12, "Command Line Interface Reference," for additional port types and details.
Step 3	**interface** *fc3* **reset**	Resets the FC interface.

Note Removing the cable to the FC interface port and re-attaching the cable also resets the interface.

Configuring a Donor Port to Extend Buffer Credits

You can configure one or more FC ports as donor ports to extend buffer credits to other FC ports. This feature is useful for counteracting performance degradation caused by transmission delay to distant devices.

The sole purpose of a donor port is to extend buffer credits to selected FC ports in the SN 5428-2 Storage Router; a donor port cannot provide connectivity to an FC device.

To donate credits, the donor port type must be *donor.* To receive credits, a selected FC port must be configured to receive extended credits and must be one of the following types: E_Port, F_Port or G_Port. A port with a running loop port type (FL_Port, GL_Port, or TL_Port) cannot receive donated credits. Each donor port donates 11 buffer credits, all of which must go to a single recipient port configured for credit extension.

Use the following procedure to configure a port to receive extended credits and to configure the donor port.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**interface** *fc8* **type donor**	Set the FC interface port type to donor.
Step 3	**interface** *fc1* **type f-port**	Set the FC interface port type to F_Port.
Step 4	**interface** *fc1* **ext-credit** *11*	Set a recipient interface port to receive credit extension. Buffer credits can be made available only in increments of 11, with a maximum of 77 credits.

See the **interface fc? type** and the **interface fc? ext-credit** commands in Chapter 12, "Command Line Interface Reference," for additional details about extended credits.

Configuring the Domain ID

Each switch in the FC switched fabric zone has a domain ID. The SN 5428-2 must be configured with a domain ID that is unique and compatible with the FC switched fabric zone.

Use the following procedure to configure the unique domain ID.

Note Changing the domain ID in an operational fabric will cause traffic disruption. To avoid this problem, remove the SN 5428-2 from the fabric before making the configuration change. For example, disable all FC interfaces operating as E_Ports before making the configuration change. The domain ID change will be propagated to the fabric when the SN 5428-2 rejoins the fabric (when the FC interfaces are enabled).

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcswitch domainid** *99*	Assign a unique domain ID. The default setting for the SN 5428-2 is *1*. **Note** The domain ID must be within the operable range; see your Fibre Channel switched fabric administrator for the appropriate value. At the prompt, enter **yes** to continue and change the domain ID (Example 5-1).

Example 5-1 "fcswitch domainid" Command Warning

```
[SN5428-2A] fcswitch domainid 99
*** Warning: changing domain ID in an operational fabric will cause traffic disruption.
Do you want to continue? [yes/no (no)] yes
```

Internal FC Ports

There are two internal FC ports in the SN 5428-2, initiator WWPN1 and initiator WWPN2. These two initiator ports identify the SN 5428-2 to the switched fabric. Both initiator WWPN1 and WWPN2 are required by your zone administrator to allow participation in zoning.

To include the SN 5428-2 in FC zoning, both ports (WWPN1 and WWPN2) must be included in the zone set. A default alias of *iscsi* is provided that contains both initiators WWPN1 and WWPN2.

Use the following procedure to display initiator WWPN1 and initiator WWPN2 and the *iscsi* alias.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show fcswitch**	Display FC operational information (Example 5-2).
Step 3	**show fcalias all**	Display *iscsi* alias information (Example 5-3)

Example 5-2 Display Initiator WWPN1 and WWPN2

```
[SN5428-2A]# show fcswitch
Global attributes                     Value
------------------------------------  -----
Domain ID                             99
Domain ID lock                        disabled
Active Zoneset                        None
Zoning Merge                          SW2
Zoning Default                        All
Zoning Autosave                       enabled
Distributed Services timeout (dstov)  5000
Fabric Services timeout (fstov)       1000
Error Detect timeout (edtov)          2000
Resource Allocation timeout (ratov)   10000
Buffer to Buffer Credit (interop)     12
Initiator WWPN1                       280000048aa58710
Initiator WWPN2                       290000048aa58710
```

Example 5-3 Display "iscsi" Alias

```
[SN5428-2A]# show fcalias all
Alias Name           Member type Member value
-------------------- ----------- ------------
iscsi                wwpn        280000048aa58710
                     wwpn        290000048aa58710
```

Configuring Zoning

The SN 5428-2 zoning feature provides the ability to actively participate in FC switched fabric zones and to manage zones. Managing a zone includes creating a zone set, creating zones as zone set members, then adding devices (using WWPN) as zone members.

After the zone members are added to the zone set, you must activate the zone set. The SN 5428-2 allows you to configure multiple zone sets to satisfy the different security and access needs of your storage area network; however, only one zone set can be active at one time.

Managing zoning include the following tasks:

- Creating and deleting zone sets, zones, and aliases
- Adding a zone to a zone set and removing a zone from a zone set
- Adding a member to a zone or an alias using WWPN
- Adding an alias to a zone
- Activating and deactivating zone sets
- Clearing zones on the local SN 5428-2
- Clearing the fabric wide zoning database

To make changes to a new or an existing configuration, add, delete, or remove individual elements to create the desired configuration.

Note All zoning changes are automatically saved to the SN 5428-2 bootable configuration and, if the SN 5428-2 is connected to the FC switched fabric, the configuration changes are replicated throughout the fabric.

The configuration you create using the command line interface (or GUI) can be uploaded to a host for archiving. To restore the configuration to the zoning data base, use the **restore fcswitch zones** command. If the SN 5428-2 is connected to the FC switched fabric, the restored zoning database will be pushed into the fabric.

See Chapter 12, "Command Line Interface Reference," for a complete list of all zoning and other commands.

The following are SN 5428-2 zoning limits:

- Maximum of 256 zone sets
- Maximum of 256 zones
- Maximum of 256 aliases
- Maximum of 2000 members per zone
- Maximum of 2000 members per aliases
- Maximum of 2000 total members

Creating a zone set, a zone, and an alias

To operate within a zone, the zone set, zone, and alias names must be unique. Before creating a zone set, zone, or alias, ensure that the SN 5428-2 is attached to the switched fabric. When the SN 5428-2 is attached to the switched fabric, you will not be allowed to use a name that is already in use.

Use the following procedure to create a zone set, a zone, and an alias. In this example, the zone set is named *helen*, the zone is named *agamemnon*, and the alias is named *leto*.

Note A zone set, zone, or alias name cannot exceed 31 characters in length and must begin with an alpha character.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**zoneset** *helen*	Specify a unique zone set name.
Step 3	**zone** *agamemnon*	Specify a unique zone name.
Step 4	**fcalias** *leto*	(Optional) Specify a unique alias name.

Adding a zone to a zone set

Use the following procedure to add a zone to a zone set. In this example, the zone set is named *helen* and the zone is named *agamemnon*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**zoneset helen zone agamemnon**	Assign the zone to the zone set.

Adding a member to an alias using WWPN

Use the following procedure to add a member to an alias using the device WWPN. In this example, the alias is called *leto* and the WWPN is 201b00491585c219.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcalias leto member wwpn** *201b00491585c219*	Assign a WWPN member to the alias.

Adding a zone member to a zone using WWPN

Use the following procedure to add a zone member to a zone using the device WWPN. In this example, the zone is named *agamemnon* and the WWPN is 211b00491585c219.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**zone agamemnon member wwpn** *211b00491585c219*	Assign a WWPN member to the zone.

Adding an alias to a zone

Use the following procedure to add an alias to a zone. In this example, the zone is named *agamemnon* and the alias is named *leto*. The default alias named *iscsi* is also added to the zone.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**zone agamemnon member fcalias** *leto* **zone agamemnon member fcalias** *iscsi*	Assign the alias to the zone. **Note** If the SN 5428-2 is going to participate in the zone, be sure to add the default alias named *iscsi* to the zone.

Activating a zone set

Activation of a zone set does not require rebooting or resetting the SN 5428-2. When you activate a zone set, the system compiles the zone sets of the same name from all switches in the fabric, then distributes this merged active zone set to each switch in the fabric.

Only one zone set can be active at one time; an active zone set must be deactivated to allow the activation of another zone set.

Use the following procedure to activate a zone set. In this example, the zone set *helen* (which includes the zone member *agamemnon*) is activated.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**zoneset helen enable**	Enable the zone set. **Note** To activate a zone set, it must have at least one alias or one zone member assigned. You cannot activate an empty zone set.

Clearing zone configuration from the local SN 5428-2

When moving the SN 5428-2 from one FC zoned fabric to another, you must clear the SN 5428-2 zone configuration after you disconnect from the fabric and prior to connecting to the new fabric.

Note All ports operating as E_Ports must be inactive. If you try to clear the local zone configuration when there is an active E_Port on the SN 5428-2 Storage Router, the command fails and issues a warning message indicating the FC interfaces that are currently enabled.

Use the following procedure to clear the local zone configuration.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**clear fcswitch zones local**	Clear the zone configuration from the SN 5428-2.

Clearing the fabric wide zoning database

When reconfiguring the zones in the FC zoned fabric you must clear the zoning database and deactivate the active zone set for the entire switched fabric.

Use the following procedure to clear the local zoning database and deactivate the active zone set on the fabric.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**clear fcswitch zones fabric**	Clear the local zoning database and deactivate the active zone set for the entire switched fabric.

Verifying Configuration

Verify zoning is operational using the following procedure.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show devices**	Display all attached devices to the SN 5428-2 (Example 5-4). **Note** The **show devices** command displays an interface number for each device directly attached to that FC interface. If an interface number is not displayed, the associated device is not directly connected to an FC interface; the device is connected in the FC fabric.

Example 5-4 Verifying Zone Operation

```
[SN5428-2A]# show devices
Fabric Attached Devices detected
Interface WWPN             PortId   Device Type  Lun  Lunid Type    Lund
--------- ---------------- -------- ------------ ---- ------------- -----
fc1       22000003be3203bc 0x101e2  DASD         0    IEEE Extended 200f
fc1       2200001026448a0d 0x101e1  DASD         0    IEEE Extended 200b

Lun Description Table
Interface WWPN             Lun   Capacity Vendor       Product      Serial
--------- ---------------- ----- -------- ------------ ------------ ------
fc1       22000003be3203bc 0     17GB     SEAGATE      T207341EB    3EVON6B3000M
fc1       2200001026448a0d 0     17GB     SEAGATE      ST207340EB   3EVON4CW0002
```

CHAPTER 6

Configuring SCSI Routing

This chapter explains how to configure your SN 5428-2 Storage Router for SCSI routing and contains the following sections:

- Prerequisite Tasks, page 6-1
- Configuration Tasks, page 6-2
- Creating a SCSI Routing Instance, page 6-6
- Configuring a Server Interface, page 6-6
- Configuring iSCSI Targets, page 6-7
- Creating and Configuring an Access List, page 6-10
- Configuring Access to iSCSI Targets, page 6-11
- Verifying and Saving Configuration, page 6-14

SCSI routing can be configured using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Prerequisite Tasks

Before configuring SCSI routing, make sure you have configured all system parameters as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters."

If the VLAN service is to be used with the SN 5428-2 Storage Router, configure VLANs as described in Chapter 4, "Configuring for VLAN," before proceeding.

Configuration Tasks

To configure SCSI routing on your SN 5428-2 Storage Router, perform the following steps:

Step 1 Create a SCSI routing instance. Once an instance is created, you will configure that instance with parameters for a server interface, iSCSI targets, and access by IP hosts.

Step 2 Configure a server interface with or without VLAN.

Step 3 Configure iSCSI targets.

Step 4 (Optional) Create and configure a named access list. A named access list contains IP host identification information and is necessary if you want to control access to iSCSI targets on a per-IP host basis.

Step 5 Configure access to iSCSI targets. Associate named access lists to iSCSI targets to control target access on a per-IP host basis, or allow any IP host access to iSCSI targets.

Step 6 Verify and save configuration.

Note Although this is shown as the last step, you can verify and save the configuration at any point in the process of performing the configuration tasks. Save your configuration by using the **save all bootconfig** CLI command. This command saves all configuration data to the bootable configuration, which is then used when the storage router is rebooted.

Caution When making changes to a SCSI routing instance (such as adding or deleting targets or changing access) be sure to make the complementary changes to the iSCSI driver configuration of IP hosts that use that SCSI routing instance to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. (You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.)

Figure 6-1 illustrates SCSI routing configuration elements, and Figure 6-2 illustrates the example configuration used in this chapter. Figure 6-3 illustrates how the configuration of SCSI routing instances determines VLAN access to storage devices.

Note Configuring the SCSI routing instance does not include configuring the Fibre Channel (FC) interfaces. Once the SCSI routing instance is configured, all the FC interfaces are available. See Chapter 5, “Configuring Fibre Channel Interfaces,” for more information on the FC interfaces and default characteristics.

Figure 6-1 Configuration Elements for SCSI Routing

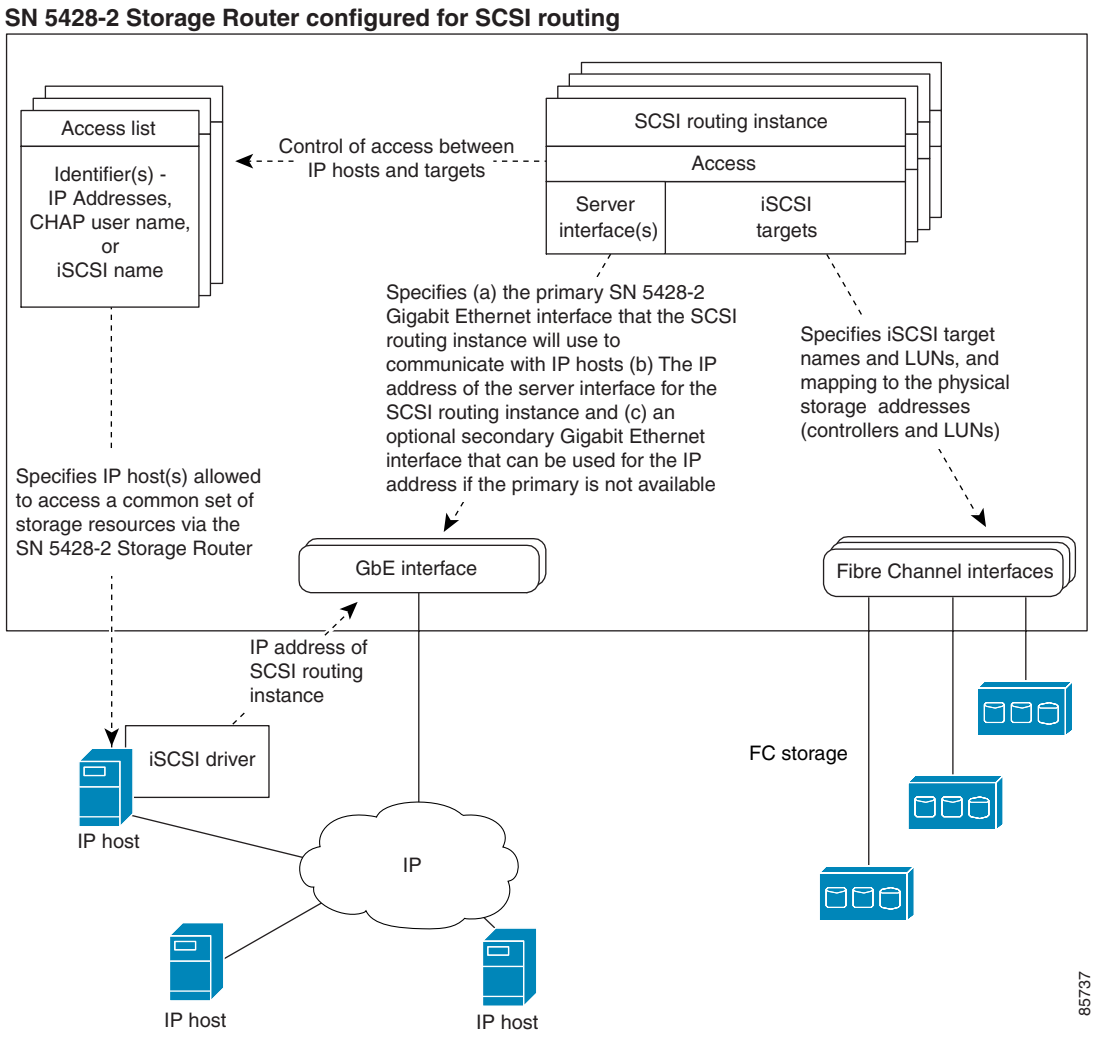


Figure 6-2 SCSI Routing Parameters Example Configuration

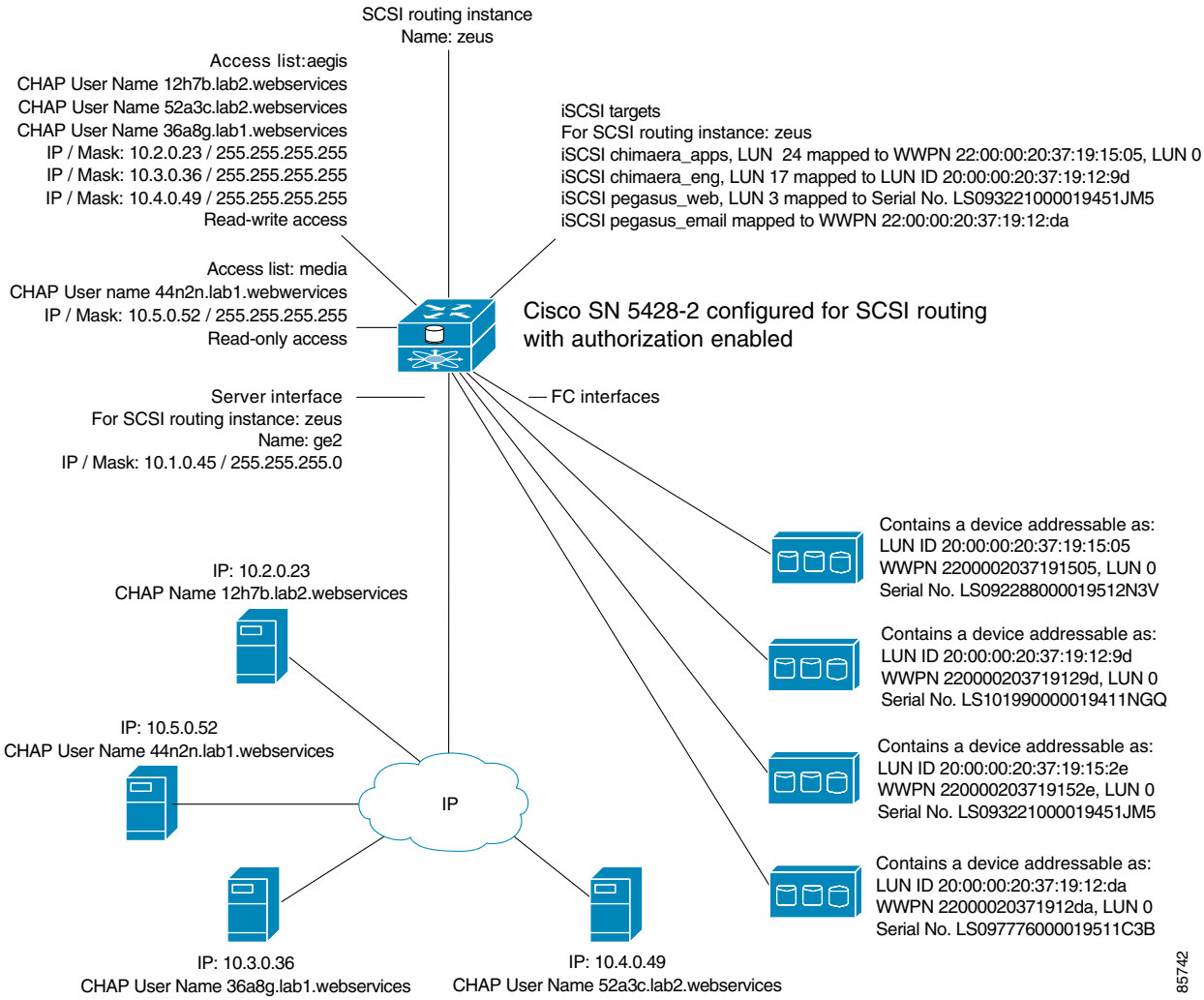
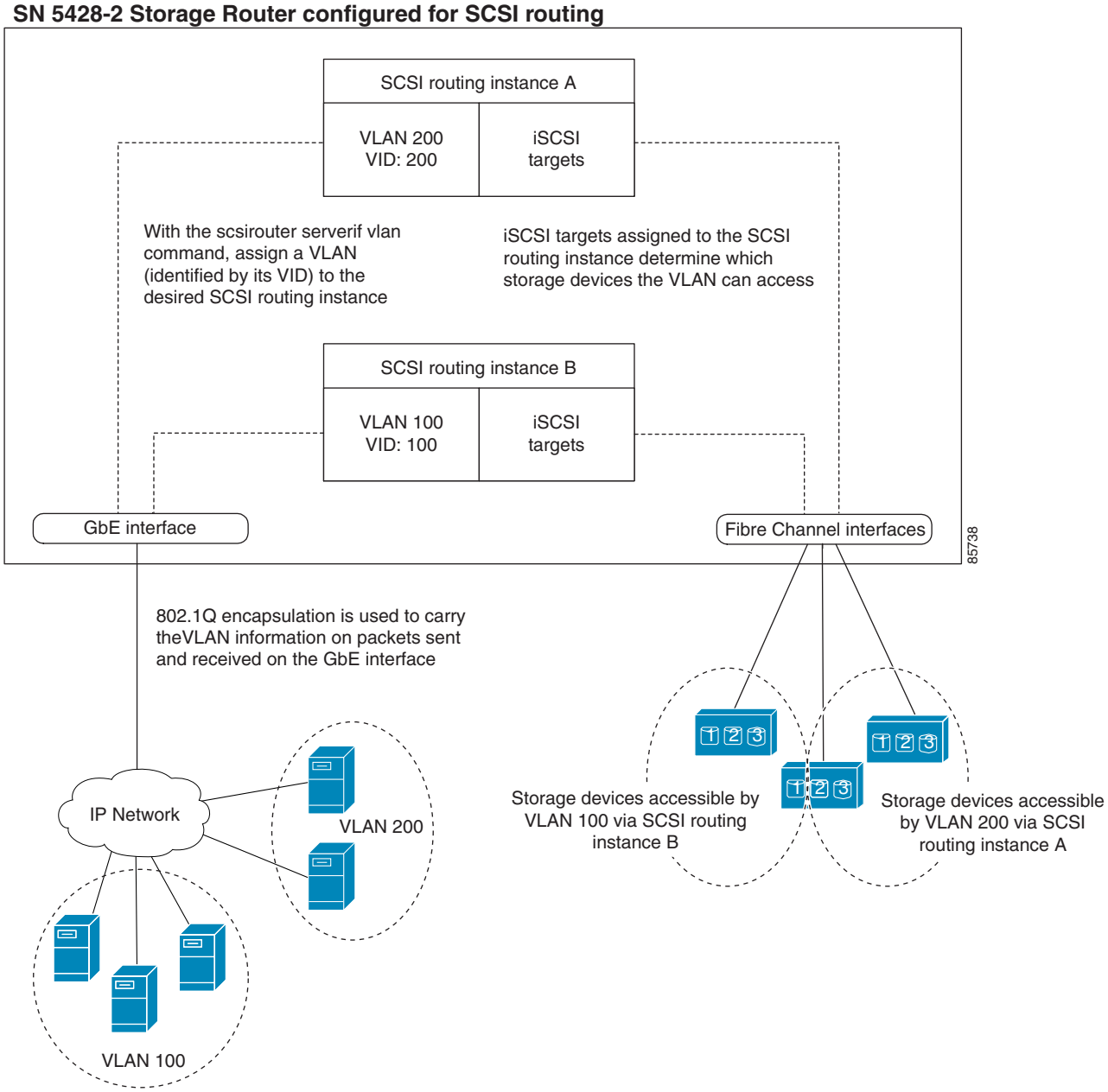


Figure 6-3 Configuration of SCSI Routing Instance Determines VLAN Access to Storage Devices


SN 5428-2 Storage Router configured for SCSI routing
SCSI routing instance A
VLAN 200
VID: 200
iSCSI
targets
With the scsirouter serverif vlan command, assign a VLAN (identified by its VID) to the desired SCSI routing instance
iSCSI targets assigned to the SCSI routing instance determine which storage devices the VLAN can access
SCSI routing instance B
VLAN 100
VID: 100
iSCSI
targets
GbE interface
Fibre Channel interfaces
85738
802.1Q encapsulation is used to carry theVLAN information on packets sent and received on the GbE interface
IP Network
VLAN 200
VLAN 100
Storage devices accessible by VLAN 100 via SCSI routing instance B
Storage devices accessible by VLAN 200 via SCSI routing instance A

Creating a SCSI Routing Instance

Creating a SCSI routing instance consists of naming the new instance. Use the following procedure to create a SCSI routing instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus*	Create a SCSI routing instance by naming the new instance (*zeus*). **Note** You can define up to 12 instances on a single SN 5428-2 or across a cluster. See Chapter 10, "Configuring a High Availability Cluster," for additional details about configuring clusters for high availability.

Configuring a Server Interface

Configuring a server interface consists of assigning a primary Gigabit Ethernet interface along with an IP address and subnet mask to the desired SCSI routing instance. If the SN 5428-2 is to be used with VLAN, specify the VLAN by its VID.

You can also choose one of the following configuration options:

- Each SCSI routing instance can be configured with multiple server interfaces. This allows IP hosts to connect to the instance and access iSCSI targets using any of the assigned server interface IP addresses.
- Each server interface can be assigned a secondary Gigabit Ethernet interface. The server interface IP address automatically moves to the secondary Gigabit Ethernet interface if the connection to the IP host from the primary Gigabit Ethernet interface is lost. To use this feature, both Gigabit Ethernet interfaces must be connected to the same network.

Note If you configure a Gigabit Ethernet IP address with a secondary interface, all Gigabit Ethernet IP addresses on the same subnet must also be configured with the same secondary interface.

Note The IP address assigned to the server interface for the SCSI routing instance cannot be on the same subnet as any other network interface.

Without VLAN

Use the following procedure to configure a server interface for a SCSI routing instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **serverif** *ge2 10.1.0.45/24*	Assign a server interface (*ge2*) to the desired SCSI routing instance (*zeus*). Specify the IP address and subnet mask (*10.1.0.45/24*) that IP hosts will use to access the SCSI routing instance. In this example, the subnet mask of 255.255.255.0 was set using CIDR style (*/24*).

With VLAN

Use the following procedure to assign a server interface and VLAN to a SCSI routing instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **serverif** *ge2* **vlan** *100 10.1.0.45/24*	Assign a VLAN, identified by its VID (*100*), to the desired SCSI routing instance (*zeus*). Specify the server interface (*ge2*) and the IP address and subnet mask (*10.1.0.45/24*) that the VLAN will use to access the SCSI routing instance. In this example, the subnet mask of 255.255.255.0 was set using CIDR style (*/24*). **Note** To look up the VID, use the **show vlan** command. VIDs are listed in the VLAN column.

Configuring iSCSI Targets

Configuring iSCSI targets consists of specifying the SCSI routing instance to which an iSCSI target is to be assigned, specifying the iSCSI target name, and mapping the iSCSI target to a physical storage device. When assigning an iSCSI target, you can specify the physical storage device either by physical storage address, LUN serial number, or by an index number assigned to the device.

Note When a new iSCSI target is configured, IP hosts do not have access to it. You need to configure access to newly created iSCSI targets according to the "Configuring Access to iSCSI Targets" section later in this chapter.

Use the procedures that follow according to mapping type and storage addressing type:

- Target-and-LUN mapping using WWPN addressing
- Target-and-LUN mapping using LUN ID addressing
- Target-and-LUN mapping using LUN Serial Number addressing
- Target-only mapping using WWPN addressing

Example 6-1 Indexed List of Storage Devices by LUN ID

```
                                        Device
Id   I/F  Lunid              Lun   Type    Vendor   Product
--- ----- ------------------ ----- ------  -------- ----------
1   fc4   2000002037191505   0     Disk    SEAGATE  ST318452FC
2   fc4   200000203719129d   0     Disk    SEAGATE  ST319452FC
3   fc4   200000203719152e   0     Disk    SEAGATE  ST319453FC
4   fc4   20000020371912da   0     Disk    SEAGATE  ST319452FC
```

Example 6-2 Indexed List of Storage Devices by WWPN

```
                                        Device
Id   I/F  WWPN               Lun   Type    Vendor   Product
--- ----- ------------------ ----- ------  -------- ----------
1   fc4   2200002037191505   0     Disk    SEAGATE  ST319451FC
2   fc4   220000203719129d   0     Disk    SEAGATE  ST319452FC
3   fc4   220000203719152e   0     Disk    SEAGATE  ST319453FC
4   fc4   22000020371912da   0     Disk    SEAGATE  ST319452FC
```

Example 6-3 Indexed List of Storage Devices by Serial Number

```
                                        Device
Id   I/F  Serial                Lun   Type    Vendor   Product
---- ----- -------------------   ----- ------  -------- ----------
1    fc4   LS092288000019512N3V 0     Disk    SEAGATE  ST319451FC
2    fc4   LS101990000019411NGQ 0     Disk    SEAGATE  ST319452FC
3    fc4   LS093221000019451JM5 0     Disk    SEAGATE  ST319453FC
4    fc4   LS097776000019511C3B 0     Disk    SEAGATE  ST319452FC
```

Target-and-LUN mapping using WWPN addressing

Use the following procedure to map iSCSI targets to storage devices by physical storage address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_apps* **lun** *24* **wwpn** *2200002037191505* **lun** *0*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*chimaera_apps*) and LUN (*24*), and map it to the desired physical address (WWPN 2200002037191505 LUN 0).

Use the following procedure to map iSCSI targets to storage devices by an index number.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_apps* **lun** *31* **wwpn** *#?*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*chimaera_apps*) and LUN (*31*), and prompt for an indexed list of available storage addresses using the number sign and a question mark (*#?*).
Step 3	**scsirouter zeus target chimaera_apps lun 31 wwpn #***1*	Choose a physical address designated by an index number (see index number 1 in Example 6-2) to map the iSCSI target (*chimaera_apps*) and LUN (*31*) combination to the desired physical address (WWPN 2200002037191505, LUN 0).

Target-and-LUN mapping using LUN ID addressing

Use the following procedure to map iSCSI targets to storage devices by physical storage address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_eng* **lun** *17* **lunid** *200000203719129d*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*chimaera_eng*) and LUN (*17*), and map it to the desired physical address (LUN ID 200000203719129d).

Use the following procedure to map iSCSI targets to storage devices by an index number.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_eng* **lun** *17* **lunid** *#?*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*chimaera_eng*) and LUN (*17*), and prompt for an indexed list of available storage addresses using the number sign and a question mark (*#?*).
Step 3	**scsirouter** *zeus* **target** *chimaera_eng* **lun** *17* **lunid #***2*	Choose a physical address designated by an index number (see index number 2 in Example 6-1) to map the iSCSI target (*chimaera_eng*) and LUN (*17*) combination to the desired physical address (LUN ID 200000203719129d)

Target-and-LUN mapping using LUN Serial Number addressing

Use the following procedure to map iSCSI targets to storage devices by serial number.

Note The storage resource must support unique serial numbers for each LUN.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *pegasus_web* **lun** *3* **serial** *LS093221000019451JM5*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*pegasus_web*) and LUN (*3*), and map it to the desired physical address (serial number LS093221000019451JM5).

Use the following procedure to map iSCSI targets to storage devices by an index number.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *pegasus_web* **lun** *3* **serial** *#?*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*pegasus_web*) and LUN (*3*), and prompt for an indexed list of available storage addresses using the number sign and a question mark (*#?*).
Step 3	**scsirouter zeus target pegasus_web lun 3 serial #***3*	Choose a physical address designated by an index number (see index number 3 in Example 6-3) to map the iSCSI target (*pegasus_web*) and LUN (*3*) combination to the desired physical address (serial number LS093221000019451JM5)

Target-only mapping using WWPN addressing

Use the following procedure to map iSCSI targets to storage devices by physical storage address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *pegasus_email* **wwpn** *22000020371912da*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*pegasus_email*), and map it to the desired physical address (WWPN 22000020371912da) and any LUNs available as part of that WWPN.

Use the following procedure to map iSCSI targets to storage devices by index numbers.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *pegasus_email* **wwpn** *#?*	Specify desired SCSI routing instance (*zeus*). Specify iSCSI target (*pegasus_email*), and prompt for an indexed list of available storage addresses using the number sign and a question mark (*#?*).
Step 3	**scsirouter zeus target pegasus_email wwpn #***4*	Choose a physical address designated by an index number (see index number 4 in Example 6-2) to map the iSCSI target (*pegasus_email*) to desired physical address (WWPN 22000020371912da).

Creating and Configuring an Access List

Creating an access list consists of naming the new list. Configuring an access list consists of identifying the IP hosts that have permission to access storage devices via iSCSI target names.

IP hosts can be identified by:

- IP address
- CHAP user name (used for iSCSI authentication)
- iSCSI Name of the IP host - The iSCSI Name is a UTF-8 character string based on iSCSI functional requirements. It is a location-independent permanent identifier for an iSCSI node. An iSCSI node can be an initiator, a target, or both.

An access list can contain one or more types of identification entries. If an identification entry type exists in the access list, an IP host attempting to access the associated storage target must have a matching entry defined in the access list. For example, if an access list contains both IP address and iSCSI Name identification entry types, then every IP host that requires access to the associated set of storage resources must have a matching IP address and iSCSI Name entry in the access list.

An access list is necessary if you want to specify access to iSCSI targets on a per-IP host basis. An access list is *not* necessary if you want to specify that any IP host can have access to the iSCSI targets configured in a SCSI routing instance; however, in this case you must still configure access as described in Configuring Access to iSCSI Targets, page 6-11.

Note For each SN 5428-2 Storage Router, you can create a maximum of 100 access lists and configure up to 200 identification entries across all access lists.

Note If there is a CHAP user name entry in the access list, the SCSI routing instance used to access the storage target must also have iSCSI authentication enabled. See Chapter 9, "Configuring Authentication," for additional information about AAA and iSCSI authentication.

Use the following procedure to create an access list. In this procedure, the access list is called *aegis* and the IP host identifiers include three IP addresses (*10.2.0.23*, *10.3.0.36*, and *10.4.0.49*) and three CHAP user names (*12h7b.lab2.webservices, 36a8g.lab1.webservices*, and *52a3c.lab2.webservices*).

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**accesslist** *aegis*	Create an access list by naming it (*aegis*). There is a 31 character limit.
Step 3	**accesslist** *aegis* **description** *"Access to zeus SCSI routing service"*	(Optional) Add a string as a description for the access list. Enclose the string using single or double quotes.
Step 4	**accesslist aegis** *10.2.0.23/32 10.3.0.36/32 10.4.0.49/32*	Add IP addresses of IP hosts to the access list. Separate multiple IP addresses with a space. To limit the access to each specific IP address, set the subnet mask to 255.255.255.255. In this example, the subnet mask was set using CIDR style (*/32*).
Step 5	**accesslist aegis chap-username** *12h7b.lab2.webservice*s **accesslist aegis chap-username** *36a8g.lab1.webservices* **accesslist aegis chap-username** *52a3c.lab2.webservices*	Add CHAP user names to the access list. In this example, each IP host has a unique CHAP user name. **Note** When using CHAP user names in an access list, iSCSI authentication must be enabled for the SCSI routing instance, and the IP host must be successfully authenticated using the configured AAA methods.

Note Access lists are cluster elements and, in a cluster environment, all access list management functions are handled by a single storage router. If you issue **accesslist** commands from another storage router in the cluster, the CLI displays an informational message with the name of the storage router that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information on operating the SN 5428-2 in a cluster.

Configuring Access to iSCSI Targets

Configuring access to iSCSI targets consists of associating a named access list to an iSCSI target to control target access on a per-IP host basis. The default for access to newly configured iSCSI targets is *none*. You must configure access to iSCSI targets according to the information provided in this section.

When configuring access, you can specify one iSCSI target at a time or all iSCSI targets associated with a SCSI routing instance, and you can specify a named access list or allow access by any IP host using a SCSI routing instance. In addition, you can deny access to iSCSI targets one at a time or all at once.

You can also associate up to two access lists with an iSCSI target: one allowing read/write access, and one allowing read-only access. The default access is *read/write*. Access lists are evaluated read/write first, and then read-only, so if an IP host is associated with both types of lists, it will be allowed read/write access.

Note Some host operating systems impose restrictions on the use of read-only access lists. For details, see the readme files and release notes for your IP host operating system.

Use the procedures that follow according to the type of access:

- Configuring access to one iSCSI target at a time
- Configuring access to all iSCSI targets at once
- Denying access to one or more iSCSI targets
- Configuring read/write and read-only access

Configuring access to one iSCSI target at a time

This section provides two procedures: one for configuring access to an iSCSI target by specific IP hosts, and one for configuring access to an iSCSI target by *any* iSCSI host.

Use the following procedure to configure access to one iSCSI target on a per-IP host basis by associating the iSCSI target with a named access list.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_apps* **accesslist** *aegis*	Specify that an iSCSI target (*chimaera_apps*), configured as part of a SCSI routing instance (*zeus*), can only be accessed by IP hosts listed in an access list (*aegis*). Because access is read/write by default, it does not need to be specified.

Use the following procedure to configure access to one iSCSI target by any iSCSI host.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *pegasus_email* **accesslist any**	Specify that an iSCSI target (*pegasus_email*), configured as part of a SCSI routing instance (*zeus*), can be accessed by any IP host. Because access is read/write by default, it does not need to be specified.

Configuring access to all iSCSI targets at once

This section provides two procedures: one for configuring access to all iSCSI targets by specific IP hosts, and one for configuring access to all iSCSI targets by *any* IP host.

Use the following procedure to configure access to all iSCSI targets associated with a SCSI routing instance. Access is controlled on a per-IP host basis by associating the iSCSI targets with a named access list.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target all accesslist** *aegis*	Specify that all iSCSI targets that were configured as part of the specified SCSI routing instance (*zeus*) can be accessed by IP hosts listed in an access list (*aegis*). Because access is read/write by default, it does not need to be specified.

Use the following procedure to configure access to all iSCSI targets associated with a SCSI routing instance. Access is open; the iSCSI targets are made available to any IP host.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target all accesslist any**	Specify that all iSCSI targets that were configured as part of the specified SCSI routing instance (*zeus*) can be accessed by any IP host. Because access is read/write by default, it does not need to be specified.

Denying access to one or more iSCSI targets

This section provides two procedures: one for denying access to one iSCSI target at a time, and one for denying access to all iSCSI targets configured as party of a specified SCSI routing instance.

Use the following procedure to deny access to one iSCSI target by any IP host.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_eng* **accesslist none**	Specify that no IP host can access the iSCSI target (*chimaera_eng*), configured as part of the specified SCSI routing instance (*zeus*).

Use the following procedure to deny access to all iSCSI targets associated with a SCSI routing instance by any IP host.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target all accesslist none**	Specify that no IP hosts can access any iSCSI targets that were configured as part of the specified SCSI routing instance (*zeus*).

Configuring read/write and read-only access

This section provides two procedures for applying read/write and read-only access to iSCSI targets, but there are many other combinations you can use.

Use the following procedure to assign read/write access to an iSCSI target by IP hosts listed in a named access list, and to assign read-only access to the same target by any other IP hosts.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_eng* **accesslist** *aegis* **rw**	Assign read/write access to the iSCSI target (*chimaera_eng*) by IP hosts listed in the access list (*aegis*).
Step 3	**scsirouter** *zeus* **target** *chimaera_eng* **accesslist any ro**	Assign read-only access to the iSCSI target (*chimaera_eng*) by any other IP hosts with access to that target.

Use the following procedure to specify that the IP hosts listed in one named access list have read/write access to an iSCSI target, and the IP host listed in another named access list has read-only access to the same target.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **target** *chimaera_eng* **accesslist** *aegis* **rw**	Assign read/write access to the iSCSI target (*chimaera_eng*) by the IP hosts listed in the access list (*aegis*).
Step 3	**scsirouter** *zeus* **target** *chimaera_eng* **accesslist** *medea* **ro**	Assign read-only access to the iSCSI target (*chimaera_eng*) by the IP host listed in the access list (*medea*).

Verifying and Saving Configuration

Verify the access list configuration and the SCSI routing configuration using the procedures that follow. You can save the configuration at any time by using the **save all bootconfig** command. You must save the running configuration to the bootable configuration for it to be retained in the storage router when it is rebooted. Once you have saved the configuration, you can verify that the configuration to be used when the storage router is rebooted matches the currently running configuration.

In a cluster environment, saving the configuration makes the SCSI routing instance and access list information available to other storage routers in the cluster.

Use the following procedure to verify access list configuration.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show accesslist**	Display a list of all existing access lists (Example 6-4).
Step 3	**show accesslist** *aegis*	Display the IP hosts identified in an access list (Example 6-5).

Example 6-4 Verifying Existence of an Access List

```
[SN5428-2A]# show accesslist
aegis
mars
medea
```

Example 6-5 Verifying IP Hosts in an Access List Named aegis

```
[SN5428-2A]# show accesslist aegis
accesslist aegis description "Access to zeus SCSI routing service"
accesslist aegis 10.2.0.23/255.255.255.255
accesslist aegis 10.3.0.36/255.255.255.255
accesslist aegis 10.4.0.49/255.255.255.255
accesslist aegis chap-username 12h7b.lab2.webservices
accesslist aegis chap-username 36a8g.lab1.webservices
accesslist aegis chap-username 52a3c.lab2.webservices
```

Use the following procedure to verify the configuration of a SCSI routing instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show scsirouter** *zeus*	Display the parameters configured for the specified SCSI routing instance (Example 6-6).

Example 6-6 Verifying Configuration for a SCSI Routing Instance

```
[SN5428-2A]# show scsirouter zeus
SCSI Router Information
Status Codes: A=active, I=inactive, C=create failed, D=not enabled, S=slave
                        CDB   Reserve  Pass Lun
Router               Stat Retry Proxy    Thru Reset Description
-------------------- ---- ----- -------- ---- ----- -----------
zeus                 A    30    disabled no   no    (not set)

SCSI Router Authentication Information
Router               Authentication  Username        Password
-------------------- --------------- --------------- --------
zeus                 none            none            none

Router     ServerIf   Vlan Vid IP/Netmask                       Secondary  TCP P
---------- ---------- -------- -------------------------------- ---------- -----
zeus       ge2                 10.1.50.51/24                    none       3260N

Target Attribute Information
                                 Accesslist Accesslist
Router     Target           Status   Read-Write Read-Only  Profile CRC        Description
---------- ---------------- -------- ---------- ---------- ------- ---------- -----------
zeus       chimaera_apps    enabled  aegis      none       High    prefer-off (not set)
zeus       chimaera_eng     enabled  aegis      medea      High    prefer-off (not set)
zeus       pegasus_web      enabled  none       none       High    prefer-off (not set)
zeus       pegasus_email    enabled  none       none       High    prefer-off (not set)

Target Mapping Information
Router     Target           Mapping    iSCSI Name
---------- ---------------- ---------- -----------
zeus       chimaera_apps    Lun-wwpn   iqn.1987-05.com.cisco:00.e732a9ff858f.chimaera_apps
zeus       chimaera_apps    Lun-wwpn   iqn.1987-05.com.cisco:00.1579a736f6ea.chimaera_apps
zeus       chimaera_eng     Lun-lunid  iqn.1987-05.com.cisco:00.0857b0b9cacf.chimaera_apps
zeus       pegasus_web      Lun-serial iqn.1987-05.com.cisco:00.2d3a2d118fe1.chimaera_apps
zeus       pegasus_email    Tgt        iqn.1987-05.com.cisco:00.4131e05d05a8.chimaera_apps

Targets - Lun Mapped via WWPN
Router     Target           Lun   WWPN Primary     Lun   WWPN Secondary   Lun
---------- ---------------- ----- ---------------- ----- ---------------- -----
zeus       chimaera_apps    24    2200002037559b0e 0
```

```
Targets - Lun Mapped via Lunid
Router    Target            Lun   Lunid
--------- ---------------- ----- ----------------
zeus       chimaera_eng     17    200000203719129d

Targets - Lun Mapped via Serial
Router     Target           Lun   Serial
---------- ---------------- ----- ----------------
zeus       pegasus_web      3     LS093221000019451JM5
```

Configuring Transparent SCSI Routing

This chapter explains the configuration process for a transparent SCSI routing deployment of the SN 5428-2 Storage Router and provides procedures to verify the configuration. It contains the following sections:

- Prerequisite Tasks, page 7-1
- Summary of Configuration Process, page 7-1
- Verifying Configuration, page 7-3

Transparent SCSI routing is configured with the values entered with the initial system configuration script. To verify the configuration, use the CLI commands as described in this chapter.

The web-based GUI is not available for transparent SCSI routing, since this deployment option requires minimal configuration of the SN 5428-2.

Prerequisite Tasks

Before verifying the transparent SCSI routing configuration, make sure you have configured all system parameters as described in Chapter 2, “First-Time Configuration,” or Chapter 3, “Configuring System Parameters.”

Summary of Configuration Process

The configuration parameters needed to create an instance of SCSI routing in an SN 5428-2 deployed for transparent SCSI routing are entered with the initial system configuration script. Option number 2 (transparent SCSI routing) must be chosen as the configuration deployment for the SN 5428-2 for the first question in the script.

When you select transparent SCSI routing, the script requests the mode of deployment: static or dynamic:

- Static mode

  For most operations, static mode is the preferred selection. It saves the mappings of IP hosts (iSCSI clients) to FC addresses (FC initiator WWPNs), making them persistent across iSCSI client logouts/logins and storage router reboots. These mappings can be removed individually or cleared entirely using the **clear static iscsibindings** command. See Chapter 12, “Command Line Interface Reference,” for more information.

- Dynamic mode

  When transparent SCSI routing is deployed in dynamic mode, the iSCSI client-to-internal FC WWPN mappings are not persistent across reboots; they are reset each time any of the following occurs:

  - Whenever the storage router is rebooted
  - Whenever an IP host (iSCSI client) logs in and out, then logs back in

For both static mode and dynamic mode, the maximum number of FC WWPNs available on the storage router is 62; a maximum of 62 iSCSI clients can be logged in at any one time. As each new iSCSI client connects and logs in to the storage router, it is assigned (mapped) to the next available internal FC WWPN. After the maximum number of iSCSI clients have logged in, each additional iSCSI client connection will be rejected until one of the following occurs, depending on whether the storage router is deployed in dynamic or static mode:

- In dynamic mode, each additional iSCSI connect is rejected until an iSCSI client logs out, making an FC WWPN available.
- In static mode, each additional iSCSI connect is rejected until a binding is manually cleared to make an FC WWPN available. Bindings can be manually cleared only in static mode. To view all saved mappings, use the **show static iscsibindings** CLI command. To see which mappings are currently being used, issue the **show interface fci1 iscsibindings** and **show interface fci2 iscsibindings** commands. To clear bindings that are not being used, issue the **clear static iscsibinding** command.

Note To deploy dynamic mode with transparent SCSI routing, the intelligent storage array connected to the SN 5428-2 must support an FC extended port login, which contains the IP Host (iSCSI initiator name) and the associated IP address embedded in the FC login frame. The iSCSI FC PLOGI frame is not used.

The final parameter needed to create an instance of SCSI routing in an SN 5428-2 deployed for transparent SCSI routing is at least one IP address assigned to a Gigabit Ethernet interface. IP hosts access FC storage using this address.

The initial configuration script allows you to associate each Gigabit Ethernet interface with a unique IP address, or specify a single IP address that can be presented on either interface. If you configure a single IP address that can be presented on either interface, both Gigabit Ethernet interfaces must be connected to the same network segment.

Once all requested values have been entered and the script completes, a single SCSI routing instance named, *transparent*, is automatically created. The SN 5428-2 then initiates the target discovery process and creates an iSCSI logical target for each Fibre Channel target discovered.

Afterwards, the SN 5428-2 will discover new targets whenever any of the following occurs:

- A new target or Fibre Channel switch or hub is added to the SN 5428-2.
- cable is plugged in causing a loop initialization primitive LIP.
- The SN 5428-2 is rebooted.

Verifying Configuration

Use the following procedure to verify the configuration of the SCSI routing instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show scsirouter** *transparent* or **show scsirouter all**	Display configuration for SCSI routing instance (Example 7-1). **Note** As shown in the second command, you can type the keyword, **all**, as a shortcut, instead of the SCSI routing instance name, *transparent*.

Example 7-1 Verifying Configuration of Transparent SCSI Routing Instance

```
[SN5428-2]# show scsirouter transparent
SCSI Router Information
Status Codes: A=active, I=inactive, C=create failed, D=not enabled, S=slave
                              CDB   Lun
Router               Stat Auth Retry Reset Description
-------------------- ---- ---- ----- ----- -----------
transparent          A    none 30    no    (not set)

SCSI Router Authentication Information
Router               Authentication  Username        Password
-------------------- --------------- --------------- --------
transparent          none            none            none

Router     ServerIf   Vlan Vid IP/Netmask                       Secondary  TCP Port SLP
---------- ---------- -------- -------------------------------- ---------- -------- ---
transparen ge1                 10.1.31.243/24                   none       3260     OFF
transparen ge2                 10.1.26.243/24                   none       3260     OFF

Target Attribute Information
                                    Accesslist Accesslist
Router     Target           Status   Read-Write Read-Only  Profile CRC        Description
---------- ---------------- -------- ---------- ---------- ------- ---------- -----------
transparen 2200002037a761c7 enabled  any        none       High    prefer-off (not set)
transparen 2200002037a7618f enabled  any        none       High    prefer-off (not set)
transparen 2200002037a7518d enabled  any        none       High    prefer-off (not set)

Target Mapping Information
Router     Target           Mapping    iSCSI Name
---------- ---------------- ---------- -----------
transparen 21000020371912ee Tgt        eui.21000020371912ee
transparen 21000020371912a2 Tgt        eui.21000020371912a2
transparen 21000020371912a3 Tgt        eui.21000020371912a3
transparen 21000020371912d1 Tgt        eui.21000020371912d1
transparen 2100002037c59e27 Tgt        eui.2100002037c59e27

Targets - Target Mapped
Router     Target           WWPN Primary     WWPN Secondary
---------- ---------------- ---------------- ----------------
transparen 21000020371912ee 21000020371912ee
transparen 21000020371912a2 21000020371912a2
transparen 21000020371912a3 21000020371912a3
transparen 21000020371912d1 21000020371912d1
transparen 2100002037c59e27 2100002037c59e27
```

Use the following procedure to verify logged-in IP hosts and bound Fibre Channel targets.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show interface** *fci1* **iscsilogins**	Display logged-in IP hosts and bound Fibre Channel targets on internal FC interface fci1 (Example 7-2).
Step 3	**show interface** *fci2* **iscsilogins**	Display logged-in IP hosts and bound Fibre Channel targets on internal FC interface fci2 (Example 7-3).

Example 7-2 Verifying Logged-in IP Hosts and Bound Fibre Channel Targets on fci1

```
[SN5428-2]# show interface fci1 iscsilogins
Initiator      Target                        IP Host
     ALPA  portID  State       WWPN         IP address   IP Host Name
  0   ef                 200000023d070740   10.1.10.244  iqn.1987-05.com.cisco.00.sn5428-4
            e0      6    2100005028b64d1a
            dc      6    2100005028b6431c
            b6      6    2100005028b64d0a
  1   e8                 200100023d070740   10.0.5.159   iqn.1987-05.com.cisco.02.9FD38900B2FAC8E036D3D3.NT10
            e0      6    2100005028b64d1a
            dc      6    2100005028b6431c
            b6      6    2100005028b64d0a
  2   e4                 200200023d070740   10.0.5.226   iqn.1987-05.com.cisco.02.B826B52E725BAFA5CAB913.NT9
            e0      6    2100005028b64d1a
            dc      6    2100005028b6431c
            b6      6    2100005028b64d0a
  3   e2                 200300023d070740   10.0.5.112   iqn.1987-05.com.cisco.02.16E9C60D686BC79113C401.WIN1
            e0      6    2100005028b64d1a
            dc      6    2100005028b6431c
            b6      6    2100005028b64d0a
```

Example 7-3 Verifying Logged-in IP Hosts and Bound Fibre Channel Targets on fci2

```
[SN5428-2]# show interface fci2 iscsilogins
Initiator        Target                          IP Host
     ALPA  portID  State       WWPN         IP address  IP Host Name
  0   ef                 290000023d0712c0   10.0.5.208  iqn.1987-05.com.cisco.00.sn5428-4
          203e1     6    2200002037a7c100
          203ef     6    2200002037a7c3f9
  1   e8                 290100023d0712c0   10.0.5.10   iscsi.cisco.snow110
          20101     6    210000d0b20036a0
          202e4     6    21000080e5118ab2
  2   e4                 290200023d0712b0   10.0.5.12   iscsi.cisco.snow112
          20101     6    210000d0b20036c0
          203d9     6    2200002037a7a0c5
          203da     6    2200002037b99fzf
  3   e2                 290300023d0712c0   10.0.5.15   iscsi.cisco.snow115
          20101     6    210000d0b20036d0
          202e4     6    21000080e5118ag2
  4   e1                 290400023d0712g0   10.0.5.17   iscsi.cisco.snow117
          20101     6    210000d0b20036g0
  5   e0                 290500023d0712n0   10.0.5.18   iscsi.cisco.snow118
          20101     6    210000d0b20036v0
  6   dc                 290600023d0712e0   10.0.5.27   iscsi.cisco.snow127
          20101     6    210000d0b20036a0
  7   da                 290700023d0712c0   10.0.5.28   iscsi.cisco.snow128
          20101     6    210000d0b20036d0
```

The following explains the Initiator and State fields:

Initiator	Initiator 0 is reserved for the primary initiator port. This port performs the discovery of the target devices—the same devices that appear in the **show devices** command. This port is not available to IP hosts. The port's IP address is the one assigned to the SN 5428-2 management interface, and its IP host name is the system name of the SN 5428-2 with "iqn.1987-05.com.cisco.00." preceding it. Initiators 1 to 62 (1 to 31 on each port) are used for IP hosts that are logged in. For instance in Example 7-2, IP host, NT10, is bound to initiator port 1 with WWPN 200100023d070740.
State	Login state: 0 and 1—(*not used*) 2—PLOGI request has queued to request queue 3—PLOGI response has been received 4—PLOGI response received and PRLI request queued to request queue 5—PRLI response received 6—PRLI ACC received (login successful) 7—Initial port state (not logged in) 8—LOGO is queued to request queue 9—LOGO has been transmitted

Use the following procedure to verify discovered targets.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show devices**	Display discovered targets (Fibre Channel devices). (Example 7-4.)

Example 7-4 Verifying Discovered Targets

```
[SN5428-2]# show devices
Fabric Attached Devices detected
Interface WWPN             PortId   Device Type     Lun   Lunid Type        Lunid
--------- ---------------- -------- --------------- ----- ----------------- -----
fc1       22000004cf4304cd 0x101e2  DASD            0     IEEE Extended     200f
fc1       2200002037559b0e 0x101e1  DASD            0     IEEE Extended     200b

Lun Description Table
Interface WWPN             Lun   Capacity Vendor       Product      Serial
--------- ---------------- ----- -------- ------------ ------------ ------
fc1       22000004cf4304cd 0     17GB     SEAGATE      ST318452FC   3EV0N8B4000M
fc1       2200002037559b0e 0     17GB     SEAGATE      ST318451FC   3EV0N7CW0002
```

CHAPTER 8

Configuring FCIP

This chapter explains how to configure your SN 5428-2 Storage Router for FCIP and contains the following sections:

- Prerequisite Tasks, page 8-1
- Configuration Tasks, page 8-2
- Setting the Domain ID, page 8-2
- Creating an FCIP Instance, page 8-3
- Assigning an IP Address, page 8-3
- Assigning a Protocol, Peer Name, and Peer IP Address, page 8-3
- Configuring Operational Parameters, page 8-5
- Verifying and Saving Configuration, page 8-6

FCIP is configured in the setup wizard. To configure the FCIP deployment option further and to verify the configuration, you can use the procedure in this chapter, or you can use the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Prerequisite Tasks

Before performing FCIP configuration tasks on the SN 5428-2, make sure you have configured all system parameters as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters."

To configure an FCIP instance, you will need the IP address and communication protocol of the FCIP instance on the peer storage router (another SN5428-2 configured for FCIP).

Configuration Tasks

To configure FCIP on an SN 5428-2 Storage Router, perform the following steps:

Step 1 If not already done, set the domain ID to a different value on one of the peer SN5428-2s.

Step 2 Create an FCIP instance.

Step 3 Assign an interface and IP address to the FCIP instance for use by the peer storage router (another SN 5428-2 configured for FCIP).

Step 4 Assign protocol and FCIP peer IP address.

Step 5 (Optional) Configure operational parameters as needed.

Step 6 Verify and save configuration.

Note Although this is shown as the last step, you can verify and save the configuration at any point in the process of performing the configuration tasks. Save your configuration by using the **save all bootconfig** CLI command. This command saves all configuration data to the bootable configuration, which is then used when the storage router is rebooted.

Setting the Domain ID

Domain IDs must be unique between FCIP peers to avoid conflict. If the domain IDs are the same for both peer SN 5428s, use the following procedure to set one of the peers to a different value.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcswitch domainid** *42*	Set the domain ID for the SN 5428-2. For example, set the switched zoned fabric domain ID to 42.

Creating an FCIP Instance

Creating an FCIP instance consists of naming the new instance. Use the following procedure to create an FCIP instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcip** *fcip1*	Create an FCIP instance by naming the new instance. For example, name the instance *fcip1*. The FCIP instance named *fcip1* uses the Gigabit Ethernet interface, *ge1*; the instance named *fcip2* uses *ge2*. See Chapter 12, "Command Line Interface Reference," for more information about the **fcip** command.
Step 3	**fcip** *fcip1* **description** *"Access to SAN island 5"*	(Optional) Add a description of what the FCIP instance is for. For example, add the description "*Access to SAN island 5*" to the FCIP instance *fcip1*.

Assigning an IP Address

Use the following procedure to assign an IP address to the FCIP instance.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcip** *fcip1* **networkif** *10.1.0.16/24*	Assign an IP address to the FCIP instance. For example, assign IP address *10.1.0.16* to the FCIP instance *fcip1*. See Chapter 12, "Command Line Interface Reference," for more information about the **fcip networkif** command.

Assigning a Protocol, Peer Name, and Peer IP Address

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2. Each FCIP instance can be configured with one peer.

To configure the peer of an FCIP instance, you assign a protocol and an arbitrary peer name, and specify the IP address of the peer. The peer name will be required for operational configuration changes, if any.

Assigning protocol consists of selecting a protocol type according to one of the following scenarios:

- If the peer FCIP instance is configured as a TCP client, assign protocol *tcpserver* as described in this section.
- If the peer FCIP instance is configured as a TCP server, assign protocol *tcpclient* as described in this section.
- If the peer FCIP instance is configured to use raw IP, assign protocol *raw* as described in this section.

Assigning Protocol: tcpserver

If the peer FCIP instance is configured as a TCP client, use the following procedure to assign an arbitrary peer name and configure the peer's IP address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcip** *fcip2* **destination** *fcip1san5* **tcpserver** *10.1.0.47*	Assign an arbitrary name to the peer FCIP instance, and enter its IP address. For example, assign the name *fcip1san5* to the peer of FCIP instance *fcip2*. The IP address of the peer is in dotted quad notation *10.1.0.47*, and connection is made using TCP protocol, with *fcip2* acting as a TCP server. The TCP server will listen for a TCP connection attempt from its peer, which must be configured as a TCP client. **Note** If you are configuring two FCIP instances on the SN 5428-2, do not configure both instances as TCP servers. Instead, configure both instances as TCP clients, or one as a TCP server and the other as a TCP client. If both instances have to be TCP servers then they should use different TCP ports. See Chapter 12, "Command Line Interface Reference," for more information about the **fcip destination** command.

Assigning Protocol: tcpclient

If the peer FCIP instance is configured as a TCP server, use the following procedure to assign an arbitrary name to the peer and configure the peer's IP address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcip** *fcip2* **destination** *fcip2san5* **tcpclient** *10.1.0.46*	Assign an arbitrary name to the peer FCIP instance, and enter its IP address. For example, assign the name *fcip2san5* to the peer of FCIP instance *fcip2*. The IP address of the peer is in dotted quad notation *10.1.0.46*, and connection is made using TCP protocol, with *fcip2* acting as a TCP client. The TCP client will try to initialize the TCP connection with its peer, which must be configured as a TCP server. See Chapter 12, "Command Line Interface Reference," for more information about the **fcip destination** command.

Assigning Protocol: raw

If the peer FCIP instance is configured to use raw IP, use the following procedure to assign an arbitrary name to the FCIP peer and configure the peer's IP address.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**fcip** *fcip1* **destination** *fcip1san5* **raw** *10.1.0.48*	Assign an arbitrary name to the peer FCIP instance, and enter its IP address. For example, assign the name *fcip1san5* to the peer of FCIP instance *fcip1*. The IP address of the peer is in dotted quad notation *10.1.0.48*, and connection is made using raw protocol. See Chapter 12, "Command Line Interface Reference," for more information about the **fcip destination** command.

Configuring Operational Parameters

For FCIP deployment, a large maximum transfer unit (MTU) size is desirable. To set the size of the MTU, use the **interface ge? mtusize** command to set MTU to its highest level, 9000, if possible.

To configure FCIP operational parameters, use the **fcip destination** command. The default settings for operational command parameters are listed in this section. If modifications to these settings are necessary, see Chapter 12, "Command Line Interface Reference," for details about the **fcip destination** command.

Table 8-1 describes the optional operational parameters available for TCP protocol.

Table 8-1 Optional Operational Parameters: TCP Protocol

Description	Default	Keyword
Maximum number of frames given to the Fibre Channel interface	688	**frinhiwater**
Number of seconds before a keep-alive packet is sent across an idle connection	60	**idlepingdelay**
Value of the packet trace mask. Packets are traced for debugging problems. Range is from 0x0000 to 0xffff. A value of zero will disable packet tracing.	0xffff	**pkttracemask**
Maximum number of outstanding bytes that can be received on a TCP connection	262144	**rxtcpwinsize**
TCP port number where the server is listening to and where the client is connecting to	3225	**tcpport**
Maximum number of outstanding bytes that can be transmitted on a TCP connection	2097152	**txtcpwinsize**

Table 8-2 describes the optional operational parameters available for raw protocol.

Table 8-2 Operational Parameters: Raw Protocol

Description	Default	Keyword
Maximum number of bytes outstanding on a raw IP connection	16777216	**bcouthiwater**
Maximum number of frames given to the Fibre Channel interface	688	**frinhiwater**
Maximum number of frames outstanding on a raw IP connection	1024	**frouthiwater**
Number of seconds before a keep-alive packet is sent across an idle connection	60	**idlepingdelay**
Initial timeout of a transmitted frame on a raw IP connection	0 ticks[1]	**initialtimeout**
IP protocol used in the IP header on a raw IP connection	0x04	**ipprotocol**
Maximum time for any one retransmission on a raw IP connection	48 ticks	**maxtimeout**
Maximum number of frames not acknowledged on a raw IP connection	16	**peerneedsackhiwater**
Value of the packet trace mask	0xffff	**pkttracemask**
Maximum number of times a packet is retransmitted on a raw IP connection	4	**rexmitcount**
Number of ticks to add to a packet's timeout value before retransmitting the packet on a raw IP connection	0 ticks	**timeoutincrement**
Maximum time a packet is kept alive on a raw IP connection	0 ticks	**totaltimeout**

1. 60 ticks is approximately one second.

Verifying and Saving Configuration

Verify the FCIP configuration using the procedures that follow. You can save the configuration at any time by using the **save all bootconfig** command. You must save the running configuration to the bootable configuration for it to be retained in the storage router when it is rebooted. Once you have saved the configuration, you can verify that the configuration to be used when the storage router is rebooted matches the currently running configuration.

Use the following procedure to verify FCIP configuration.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show fcip** *fcip1*	Displays the operational and connection information for FCIP instance *fcip1*. (Example 8-1).

Example 8-1 Verifying Existence of an FCIP instance

```
[SN5428-2A]# show fcip fcip1
Instance  Device I/F  Network I/F
--------  ----------  -----------
fcip1     fci1        ge1 10.1.0.16

Description
-----------
Access to SAN island 5

Destination   LocalMode  IpAddress        IsConnected
-----------   ---------  ---------------  -----------
fcip1san5     raw        10.1.0.48        TRUE

LinkState
---------
UP

fcip1 Trace Status
------------------
pktTracing                  On, mask 0xffff
mboxTracing                 On
mboxCmdCount                0

fcip1 Connection Information
----------------------------
idlePingDelay               60
txAck                       0x4d
txSeq                       0x4f
rxAck                       0x4d
rxSeq                       0x4d
peerNeedsAck                0x0
WackQ                       0x0, 0xce05230
WackQCnt                    0x0F
WackQExtra                  0x0
frOut                       0x0
frOutHiWater                0x400
bcOut                       0x0
bcOutHiWater                0x200000
burstOut                    0x0
burstOutHiWater             0x200000
outFlowCtrlQ                0x0, 0x0
frIn                        0x0
frInHiWater                 0x2b0
inFlowCtrlQ                 0x0, 0x0
blockMaxSize                0x0
oosPktQ                     0x0, 0x0
ipProtocol                  0x4
reXmitCnt                   0x4
reXmitMaxTO                 0x30
reXmitTimeOutIncr           0x0
reXmitInitialTimeOut        0x0
reXmitTotalTimeOut          0x0
 192ms 256ms 384ms 768ms
```

CHAPTER 9

Configuring Authentication

This chapter explains how to configure the authentication portion of Cisco's authentication, authorization and accounting (AAA) services on the SN 5428-2 Storage Router and how to configure Enable, Login and iSCSI authentication, which use AAA authentication services.

The following tasks are covered:

- Prerequisite Tasks, page 9-2
- Using Authentication, page 9-2
- Configuration Tasks, page 9-4
- Configuring AAA Authentication Services, page 9-11
- Creating Named Server Groups, page 9-14
- Creating AAA Authentication Lists, page 9-15
- Testing Authentication, page 9-17
- Configuring Two-Way Authentication, page 9-18
- Enabling iSCSI Authentication, page 9-19
- Verifying and Saving Configuration, page 9-19

The AAA authentication function is always enabled for the storage router; it cannot be disabled.

Authentication parameters can be configured using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Note The web-based GUI is not available for storage routers deployed for transparent SCSI routing.

Prerequisite Tasks

Before performing AAA authentication configuration tasks on the storage router, make sure you have configured system parameters as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters." If the storage router is deployed for SCSI routing, you should also configure SCSI routing instances as described in Chapter 6, "Configuring SCSI Routing," before proceeding. See the iSCSI driver readme file for details on configuring IP hosts for iSCSI authentication.

Note AAA authentication configuration settings are cluster-wide elements and are shared across a cluster. All AAA configuration and management functions are performed from a single storage router in a cluster. Issue the **show cluster** command to identify the storage router that is currently performing AAA configuration and management functions.

Using Authentication

AAA is Cisco's architectural framework for configuring a set of three independent security functions in a consistent, modular manner. Authentication provides a method of identifying users (including login and password dialog, challenge and response, and messaging support) prior to receiving access to the requested object, function, or network service.

The SN 5428-2 Storage Router implements the authentication function for three types of authentication:

- iSCSI authentication—provides a mechanism to authenticate all IP hosts that request access to storage via a SCSI routing instance. IP hosts can also verify the identity of a SCSI routing instance that responds to requests, resulting in two-way authentication.
- Enable authentication—provides a mechanism to authenticate users requesting access to the SN 5428-2 in Administrator mode via the CLI **enable** command or an FTP session.
- Login authentication—provides a mechanism to authenticate users requesting access to the SN 5428-2 in Monitor mode via the login process from a Telnet session, SSH session or the management console.

iSCSI Authentication

When enabled, iSCSI drivers provide user name and password information each time an iSCSI TCP connection is established. iSCSI authentication uses the iSCSI Challenge Handshake Authentication Protocol (CHAP) authentication method.

iSCSI authentication can be enabled for specific SCSI routing instances. Each SCSI routing instance enabled for authentication can be configured to use a specific list of authentication services, or it can be configured to use the default list of authentication services.

For IP hosts that support two-way authentication, the SCSI routing instance can also be configured to provide user name and password information during the iSCSI TCP connection process.

Note iSCSI authentication is available for SN 5428-2 storage routers deployed for SCSI routing or transparent SCSI routing only; it is not available for storage routers deployed for FCIP.

Enable Authentication

When configured, a user enters password information each time the CLI **enable** command is entered from the management console, or from a Telnet or SSH management session.

Because the **enable** command does not require you to enter a user name, configured authentication services that require a user name (such as RADIUS or TACACS+ servers) are passed the default user name, *$enab15$,* along with the entered password for authentication. If no authentication services are configured, the entered password is checked against the Administrator mode password configured for the storage router.

If the storage router is configured to allow FTP access, Enable authentication also authenticates users attempting to login and establish an FTP session with the storage router.

Login Authentication

When configured, you are prompted to enter a user name and password each time access to the storage router is attempted from the management console, or from a Telnet or SSH management session.

AAA Authentication Services

AAA authentication is configured by defining the authentication services available to the storage router. iSCSI, Enable and Login authentication types use AAA authentication services to administer security functions. If you are using remote security servers, AAA is the means through which you establish communications between the SN 5428-2 and the remote RADIUS or TACACS+ security server.

Table 9-1 lists the AAA authentication services and indicates which authentication types can be performed by each service.

Table 9-1 AAA Authentication Services

Authentication Service	Description	Authentication Types
RADIUS	A distributed client/server system that secures networks against unauthorized access. The SN 5428-2 sends authentication requests to a central RADIUS server that contains all user authentication and network service access information.	All
TACACS+	A security application that provides centralized validation of users. TACACS+ services are maintained in a database on a TACACS+ daemon running, typically, on a UNIX or Windows NT workstation.	All
Local or Local-case	Uses a local username database on the storage router for authentication. Local-case indicates that the user name authentication is case-sensitive. Passwords authentication is always case-sensitive.	Login and iSCSI authentication only
Enable	Uses the Administrator mode password configured for the storage router.	Enable and Login authentication only
Monitor	Uses the Monitor mode password configured for the storage router.	Enable and Login authentication only

Configuration Tasks

To configure iSCSI, Enable or Login authentication and the associated AAA authentication services on the storage router, perform the following steps:

Step 1 Configure the desired authentication services, such as RADIUS, TACACS+ and the local username database.

Step 2 (Optional) Create named groups of RADIUS and TACACS+ servers.

Step 3 Create AAA authentication lists.

Step 4 (Optional) Test authentication using configured AAA authentication services.

Step 5 (Optional) Configure the user name and password for SCSI routing instances that will participate in two-way authentication.

Step 6 Enable authentication for individual SCSI routing instances.

Step 7 Verify and save AAA and iSCSI authentication configuration.

Figure 9-1 illustrates AAA authentication configuration elements used for iSCSI authentication and Figure 9-2 illustrates the example configuration of iSCSI authentication and AAA authentication services used in this chapter.

Figure 9-1 iSCSI Authentication Configuration Elements

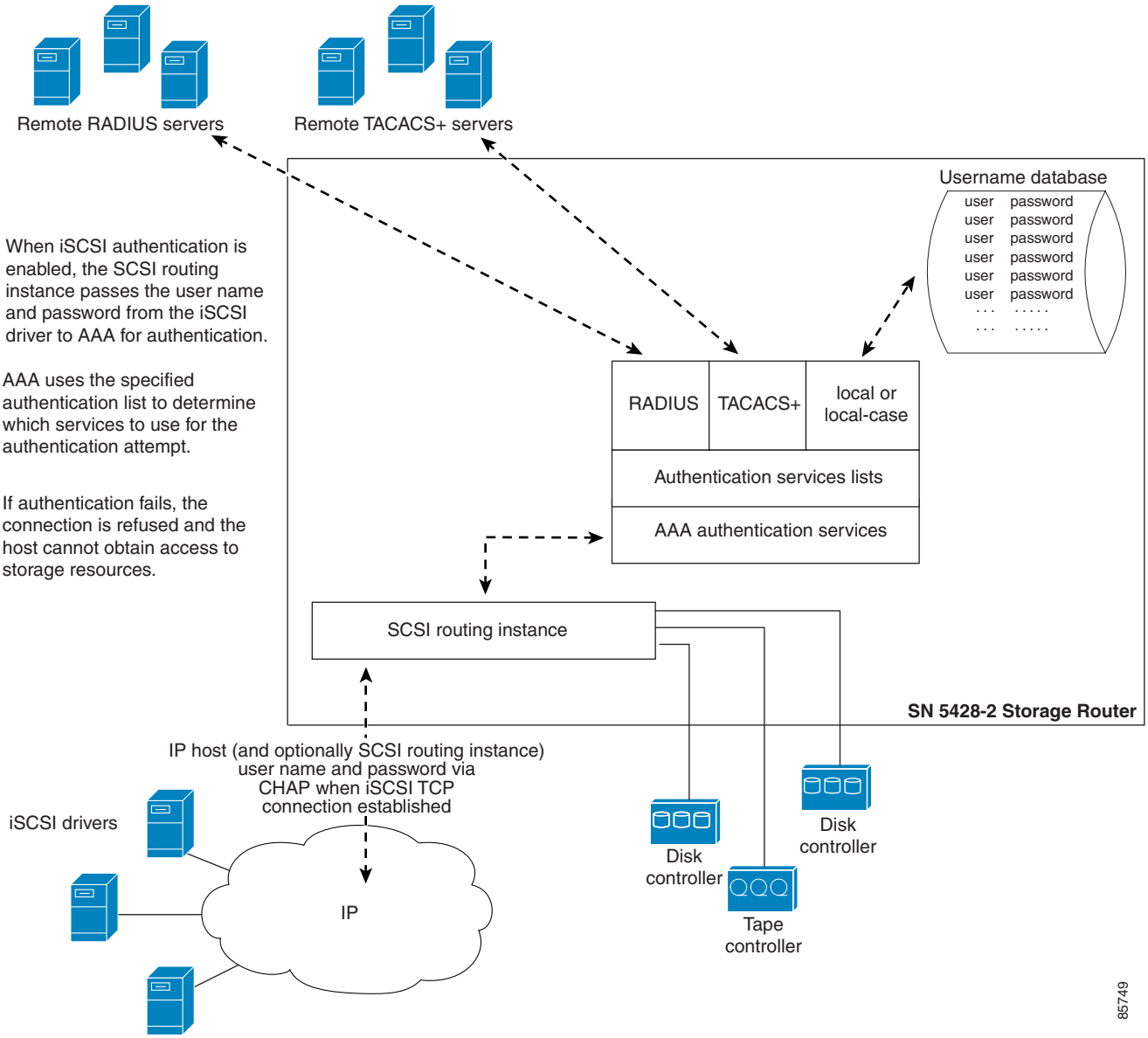

Remote RADIUS servers
Remote TACACS+ servers
When iSCSI authentication is enabled, the SCSI routing instance passes the user name and password from the iSCSI driver to AAA for authentication.
AAA uses the specified authentication list to determine which services to use for the authentication attempt.
If authentication fails, the connection is refused and the host cannot obtain access to storage resources.
Username database
user password
user password
user password
user password
user password
user password
RADIUS
TACACS+
local or local-case
Authentication services lists
AAA authentication services
SCSI routing instance
SN 5428-2 Storage Router
IP host (and optionally SCSI routing instance) user name and password via CHAP when iSCSI TCP connection established
iSCSI drivers
IP
Disk controller
Disk controller
Tape controller
85749

Figure 9-2 iSCSI Authentication Example Configuration

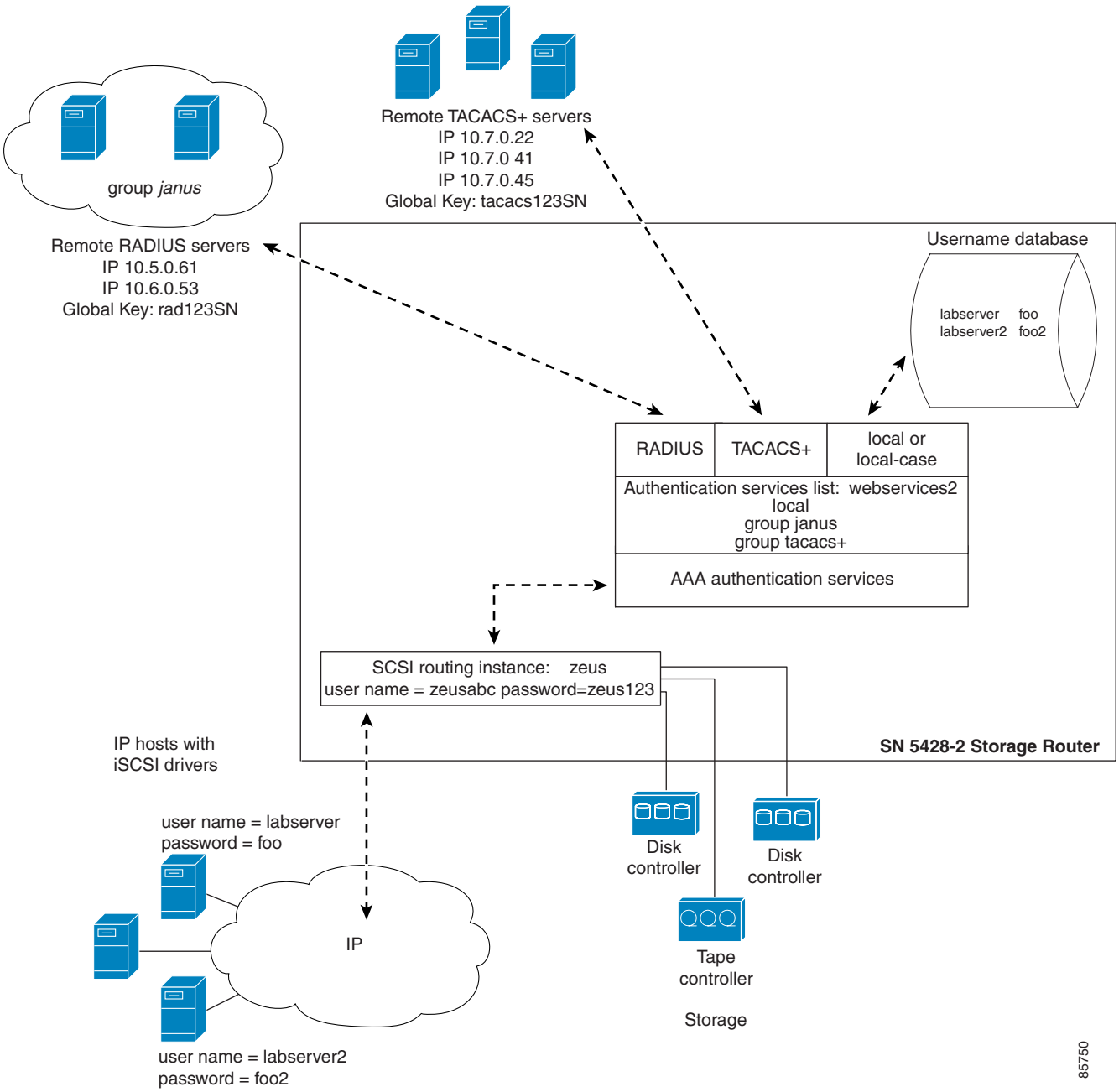


Figure 9-3 illustrates AAA authentication configuration elements used for Enable authentication and Figure 9-4 illustrates the example configuration of Enable authentication and AAA authentication services used in this chapter.

Figure 9-3 Enable Authentication Configuration Elements

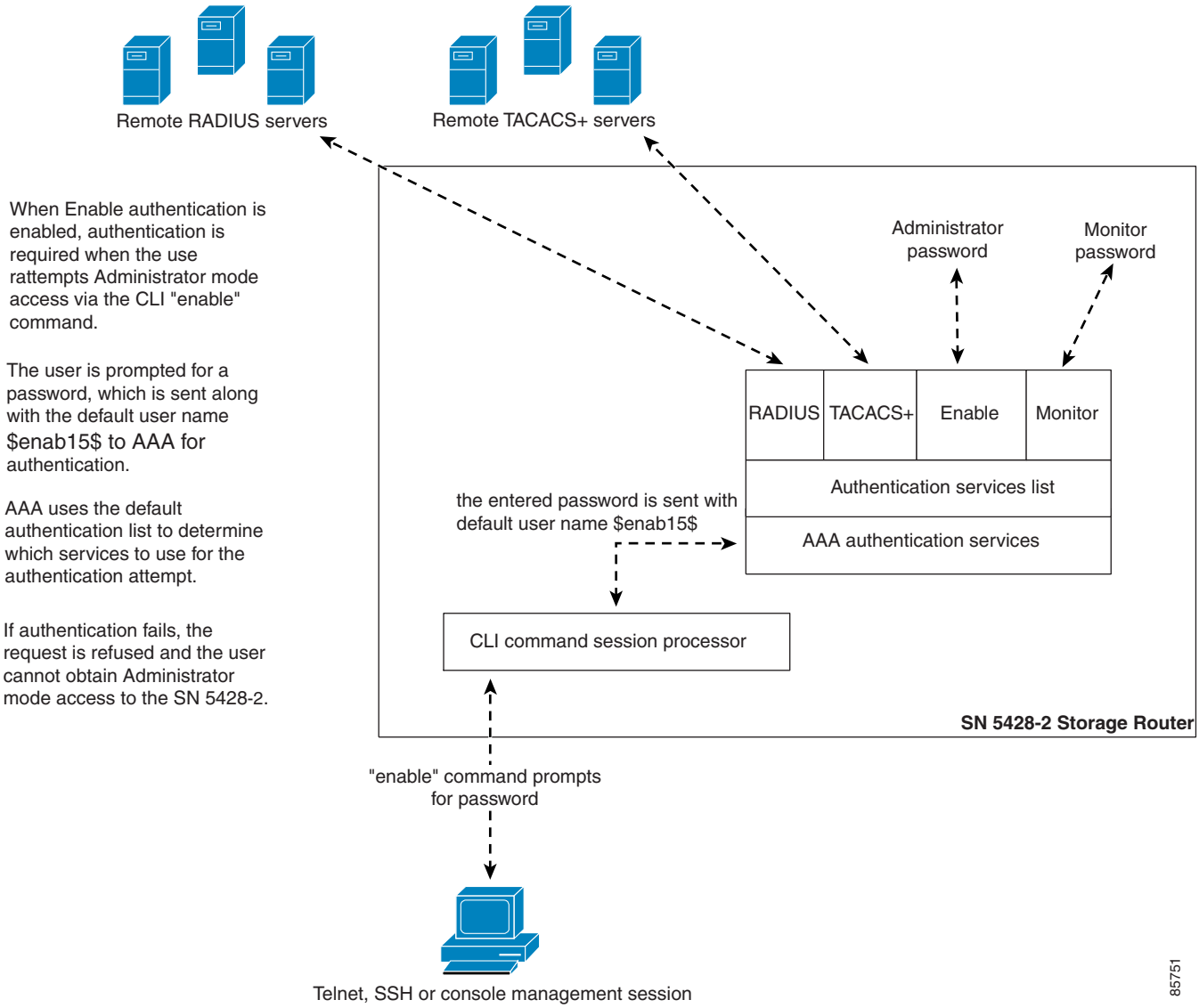

Remote RADIUS servers
Remote TACACS+ servers
When Enable authentication is enabled, authentication is required when the use rattempts Administrator mode access via the CLI "enable" command.
The user is prompted for a password, which is sent along with the default user name $enab15$ to AAA for authentication.
AAA uses the default authentication list to determine which services to use for the authentication attempt.
If authentication fails, the request is refused and the user cannot obtain Administrator mode access to the SN 5428-2.
Administrator password
Monitor password
RADIUS
TACACS+
Enable
Monitor
Authentication services list
AAA authentication services
the entered password is sent with default user name $enab15$
CLI command session processor
SN 5428-2 Storage Router
"enable" command prompts for password
Telnet, SSH or console management session
85751

Figure 9-4 Enable Authentication Example Configuration

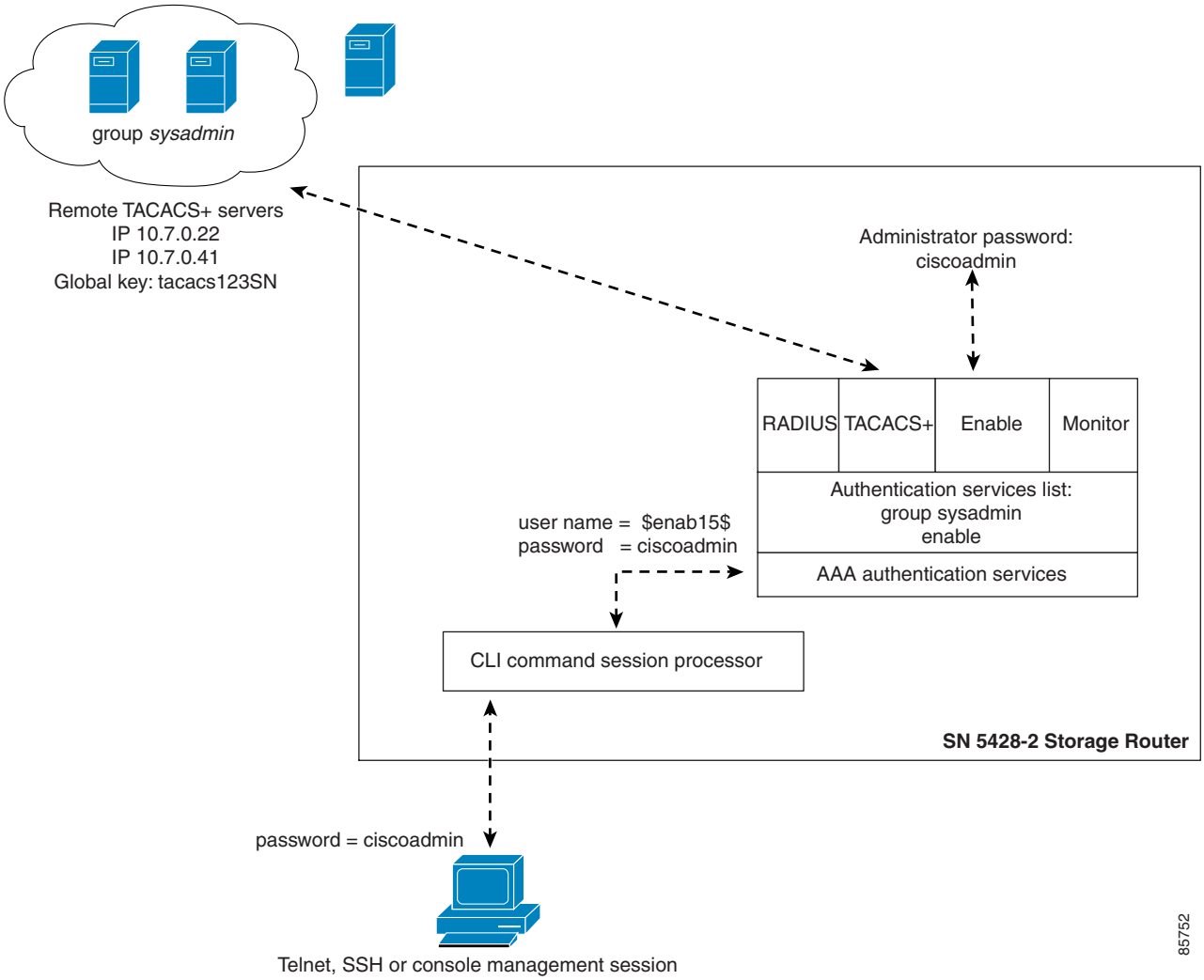


Figure 9-5 illustrates AAA authentication configuration elements used for Login authentication and Figure 9-6 illustrates the example configuration of Login authentication and AAA authentication services used in this chapter.

Figure 9-5 Login Authentication Configuration Elements

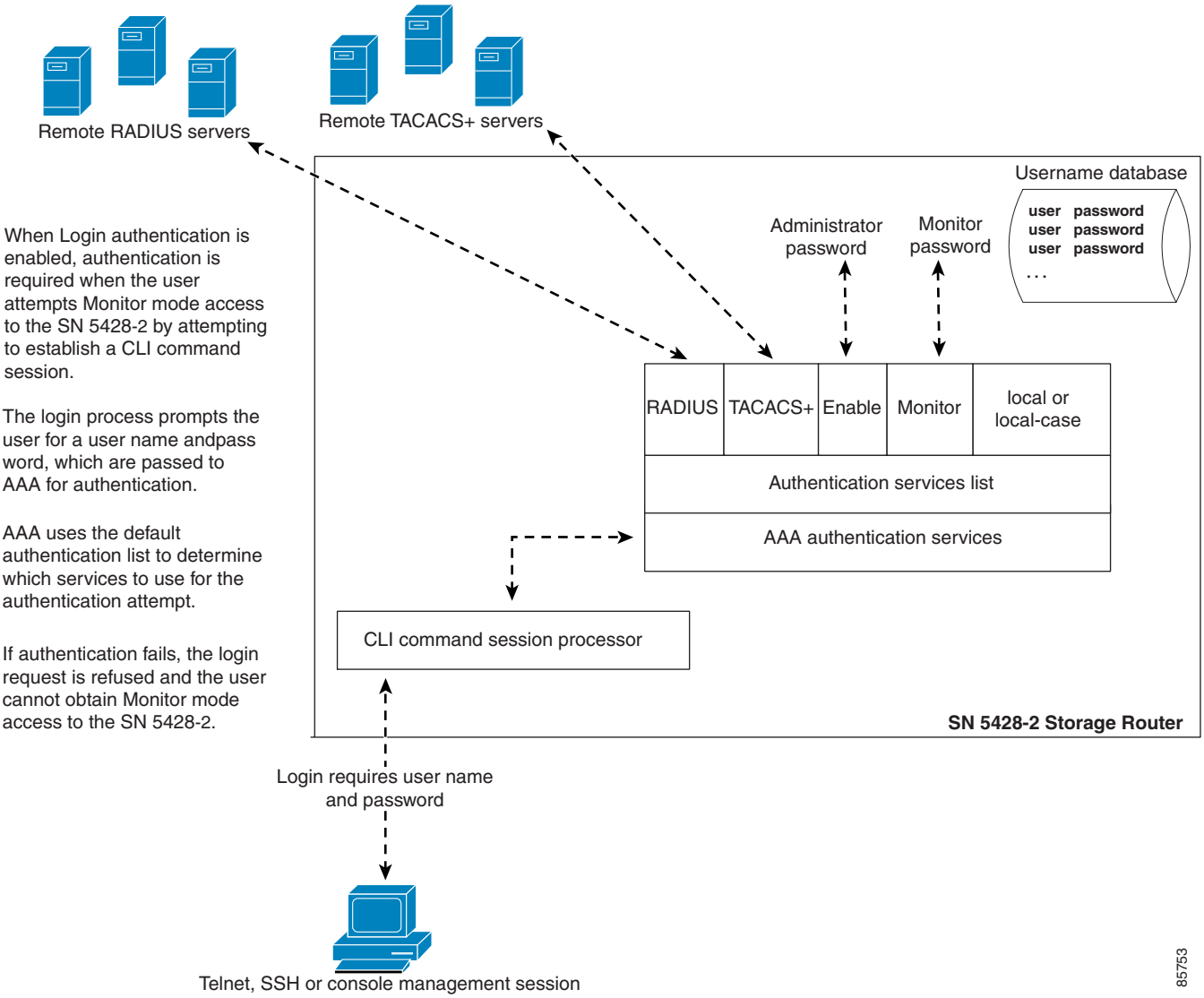
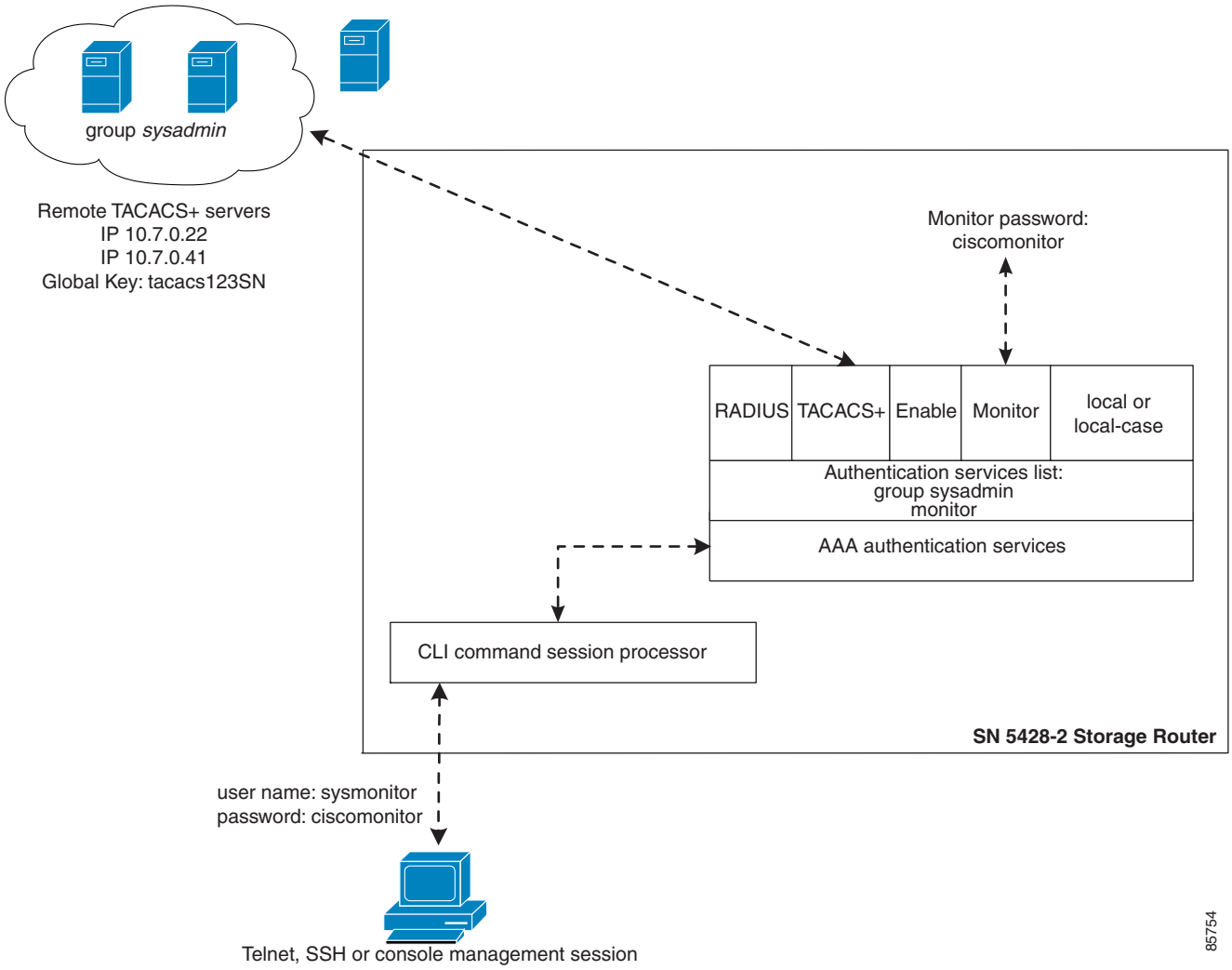

Remote RADIUS servers
Remote TACACS+ servers
When Login authentication is enabled, authentication is required when the user attempts Monitor mode access to the SN 5428-2 by attempting to establish a CLI command session.
The login process prompts the user for a user name andpass word, which are passed to AAA for authentication.
AAA uses the default authentication list to determine which services to use for the authentication attempt.
If authentication fails, the login request is refused and the user cannot obtain Monitor mode access to the SN 5428-2.
Username database
user password
user password
user password
...
Administrator password
Monitor password
RADIUS
TACACS+
Enable
Monitor
local or local-case
Authentication services list
AAA authentication services
CLI command session processor
SN 5428-2 Storage Router
Login requires user name and password
Telnet, SSH or console management session
85753

Figure 9-6 Login Authentication Example Configuration



Configuring AAA Authentication Services

Configuring AAA authentication services consists of setting the appropriate parameters for the various service options that can be used by the storage router. The storage router can use any or all of the supported services:

- RADIUS
- TACACS+
- Local username database
- Enable
- Monitor

Use the procedures that follow to configure the storage router to use each of these services.

Note See the iSCSI driver readme file for details on configuring CHAP user names and passwords for iSCSI authentication.

RADIUS Servers

Use the commands in the following procedure to configure RADIUS authentication services.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**radius-server host** *10.6.0.53*	Specify the RADIUS server to be used for AAA authentication. For example, specify the RADIUS server at *10.6.0.53* for use by the storage router. Because no port is specified, the authentication requests use the default UDP port 1645. Global timeout and retransmit values are also used. See Chapter 12, "Command Line Interface Reference," for more information about the **radius-server host** command.
Step 3	**radius-server host** *10.6.0.73* **radius-server host** *10.5.0.61*	Specify additional RADIUS servers. For example, specify the RADIUS servers at *10.6.0.73* and *10.5.0.61* as the second and third RADIUS server to be used for AAA authentication. RADIUS servers are accessed in the order in which they are defined (or for a specified server group, in the order they are defined in the group).
Step 4	**radius-server key** *rad123SN*	Configure the global authentication and encryption key to be used for all RADIUS communications between the SN 5428-2 and the RADIUS daemon. For example, set the key to *rad123SN*. This key must match the key used on the RADIUS daemon.

TACACS+ Hosts

Use the commands in the following procedure to configure TACACS+ authentication services.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**tacacs-server host** *10.7.0.22* **tacacs-server host** *10.7.0.41* **tacacs-server host** *10.7.0.45*	Specify the TACACS+ servers to be used for AAA authentication. For example, specify the TACACS+ servers at *10.7.0.22*, *10.7.0.41*, and *10.7.0.45* for use by the storage router. Because no port is specified, the authentication requests use the default port 49. The global timeout value is also used. Like RADIUS servers, TACACS+ servers are accessed in the order in which they are defined (or for a specified server group, in the order they are defined in the group). See Chapter 12, "Command Line Interface Reference," for more information about the **tacacs-server host** command.
Step 3	**tacacs-server key** *tacacs123SN*	Configure the global authentication and encryption key to be used for all TACACS+ communications between the SN 5428-2 and the TACACS+ servers. For example, set the key to *tacacs123SN*. This key must match the key used by the TACACS+ daemon.

Local Username Database

Use the commands in the following procedure to configure a local username database.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**username** *labserver* **password** *foo* **username** *labserver2* **password** *foo2*	Enter a user name and password for each host requiring authentication prior to access to storage and for each user requiring Monitor mode access to the SN 5428-2 via console, Telnet or SSH management sessions. For example, add the following user name and password combinations: • *labserver* and *foo* • *labserver2* and *foo2* For iSCSI authentication, user name and password pairs must match the CHAP user name and password pairs configured for the iSCSI drivers that require access to storage via the SCSI routing instances that have iSCSI authentication enabled. If other services are also used (such as RADIUS or TACACS+), these user name and password pairs must also be configured within the databases those services use for authentication purposes. **Note** If you use RADIUS or TACACS+ servers for Enable authentication, configure the user name *$enab15$* with the desired password. Because the **enable** command does not require you to enter a user name, the default user name *$enab15$* is passed to the AAA authentication service.

The following rules apply to passwords:

- Passwords are entered in clear text. However, they are changed to "XXXXX" in the CLI command history cache, and are stored in the local username database in an encrypted format.
- If the password contains embedded spaces, enclose it with single or double quotes.
- After initial entry, passwords display in their encrypted format. Use the **show aaa** command to display the local username database entries. The following is an example display:

  ```
  username "foo" password "9 ea9bb0c57ca4806d3555f3f78a4204177a"
  ```

  The initial "9" in the example display indicates that the password is encrypted.
- You can re-enter an encrypted password using the normal **username password** command. Enter the encrypted password in single or double quotes, starting with 9 and a single space. For example, copying and pasting *password "9 ea9bb0c57ca4806d3555f3f78a4204177a"* from the example above into the **username pat** command would create an entry for *pat* in the username database. The user named *pat* would have the same password as the user named *foo*. This functionality allows user names and passwords to be restored from saved configuration files.
- When entering a password, a zero followed by a single space indicates that the following string is not encrypted; 9 followed by a single space indicates that the following string is encrypted. To enter a password that starts with 9 or zero, followed by one or more spaces, enter a zero and a space and then enter the password string. For example, to enter the password "*0 123*" for the user named *pat*, enter this command:

  ```
  username pat password "0 0 123"
  ```

  To enter the password "*9 73Zjm 5*" for user name *lab1*, use this command:

  ```
  username lab1 password '0 9 73Zjm 5'
  ```

Enable

Enable is a special AAA authentication service; it is available for Enable and Login authentication only. The Enable service compares the password you entered with the Administrator mode password configured for the storage router. The requested access is granted only if the passwords match.

See Chapter 3, "Configuring System Parameters," for more information about changing the Administrator mode password.

Monitor

Monitor is a special AAA authentication service; it is available for Enable and Login authentication only. The Monitor service compares the password you entered with the Monitor mode password configured for the storage router. The requested access is granted only if the passwords match.

See Chapter 3, "Configuring System Parameters," for more information about changing the Monitor mode password.

Creating Named Server Groups

By default, you can use all configured RADIUS or TACACS+ servers for authentication. All configured RADIUS servers belong to the default group named *radius. A*ll configured TACACS+ servers belong to the default group named *tacacs+*.

You can also create named groups of RADIUS or TACACS+ servers, to be used for specific authentication purposes. For example, you can use a subset of all configured RADIUS servers for iSCSI authentication of IP hosts requesting access to storage via a specific SCSI routing instance.

In the example configuration shown in Figure 9-2, the group of RADIUS servers named *janus* and the default group of all TACACS+ servers will be used for iSCSI authentication of IP hosts accessing storage via the SCSI routing instance named *zeus*. In the example configurations shown in Figure 9-4 and Figure 9-6, the group of TACACS+ servers named *sysadmin* will be used for Enable and Login authentication.

Radius Server Groups

Use the commands in the following procedure to create a named group of RADIUS servers.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa group server radius** *janus*	Create a group of RADIUS servers. For example create a group named *janus*. All authentication server groups must have unique names; you cannot have a group of RADIUS servers named *janus* and a group of TACACS+ servers named *janus*.
Step 3	**aaa group server radius janus server** *10.5.0.61*	Add a RADIUS server to the named group. For example, add the RADIUS server at IP address *10.5.0.61* to the group named *janus*. Because no port is specified, authentication requests to this server use the default UDP port 1645. Servers are accessed in the order in which they are defined within the named group.
Step 4	**aaa group server radius janus server** *10.6.0.53*	Add another RADIUS server to the named group. For example, add the RADIUS server at IP address *10.6.0.53* to the group named *janus*.

TACACS+ Server Groups

Use the commands in the following procedure to create a named group of TACACS+ servers.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa group server tacacs+** *sysadmin*	Create a group of TACACS+ servers. For example create a group named *sysadmin*. All authentication server groups must have unique names; you cannot have a group of TACACS+ servers named *sysadmin* and a group of RADIUS servers named *sysadmin*.

	Command	Description
Step 3	**aaa group server tacacs+ sysadmin server** *10.7.0.22*	Add a TACACS+ server to the named group. For example, add the TACACS+ server at IP address *10.7.0.22* to the group named *sysadmin*. Because no port is specified, authentication requests to this server use the default port 49. Servers are accessed in the order in which they are defined within the named group.
Step 4	**aaa group server tacacs+ sysadmin server** *10.7.0.41*	Add another TACACS+ server to the named group. For example, add the TACACS+ server at IP address *10.7.0.41* to the group named *sysadmin*.

Creating AAA Authentication Lists

iSCSI, Enable and Login authentication use lists of defined AAA authentication services to administer security functions. The list that is created for Enable and Login authentication must be named *default*. iSCSI authentication supports a variety of AAA authentication lists.

Use the procedures that follow according to the type of authentication required:

- iSCSI authentication
- Enable authentication
- Login authentication

iSCSI authentication

Use the commands in the following procedure to build a unique list of AAA authentication services to be used for iSCSI authentication.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa authentication iscsi** *webservices2* **local group** *janus* **group tacacs+**	Create a unique list of authentication services for iSCSI authentication. For example, create the list called *webservices2* so that AAA first tries to perform authentication using the local username database. If AAA fails to find a user name match, an attempt is made to contact a RADIUS server in the server group named *janus*. If no RADIUS server in group janus is found, RADIUS returns an error and AAA tries to use perform authentication using all configured TACACS+ servers. If no TACACS+ server is found, TACACS+ returns an error and AAA authentication fails. If a RADIUS or TACACS+ server does not find a user name and password match, authentication fails and no other methods are attempted.

Note If local or local-case is the first service in the authentication list and a user name match is not found, the next service in the list will be tried. If local or local-case is not the first service, authentication fails if a user name match is not found. Authentication always fails if a RADIUS or TACACS+ server fails to find a user name match.

Enable authentication

Use the commands in the following procedure to build a default list of AAA authentication services to be used for Enable authentication. Building the default list completes the configuration of Enable authentication and makes it immediately effective.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa authentication enable default group** *sysadmin* **enable**	Create a default list of authentication services for Enable authentication. For example, create a list so that AAA first tries to perform authentication using the TACACS+ servers in the group named *sysadmin*. If no TACACS+ server is found, TACACS+ returns an error and AAA attempts authentication using the configured Administrator mode password. If the password you entered does not match the configured Administrator mode password, authentication fails and no other methods are attempted.

Because the **enable** command requires you to enter a password but does not allow you to enter a user name, Enable authentication passes a fixed user name of $enab15$, along with the password you entered, to a RADIUS or TACACS+ server for authentication purposes.

Note Local and local-case services cannot be used for Enable authentication.

Login authentication

Use the commands in the following procedure to build a default list of AAA authentication services to be used for Login authentication. Building the default list completes the configuration of Login authentication and makes it immediately effective.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa authentication login default group** *sysadmin* **monitor**	Create a default list of authentication services for Login authentication. For example, create a list so that AAA first tries to perform authentication using the TACACS+ servers in the group named *sysadmin*. If no TACACS+ server is found, TACACS+ returns an error and AAA attempts authentication using the configured Monitor mode password (eliminating authentication of the user name). If the password you entered does not match the configured Monitor mode password, authentication fails and no other methods are attempted.

Testing Authentication

You can perform authentication testing at any time. For example, before enabling iSCSI authentication for a SCSI routing instance, you can test iSCSI authentication. The user name and password are passed to AAA authentication, which performs authentication using the specified iSCSI authentication list.

The command response indicates a pass or fail status.

iSCSI Authentication

Use the commands in the following procedure to test iSCSI authentication.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa test authentication iscsi** *webservices2 labserver foo* **aaa test authentication iscsi** *webservices2 labserver2 foo2*	Test the user names and passwords listed in the username database. AAA authentication uses the services in the list named *webservices2* for authentication (Example 9-1).

Example 9-1 Testing iSCSI Authentication

```
*[SN5428-2-MG1]# aaa test authentication iscsi webservices2 labserver foo
Sep 02 14:37:00:aaa:AS_NOTICE :Auth test request being queued

Sep 02 14:37:00:aaa:AS_NOTICE :Auth test request complete, status = pass
```

Enable Authentication

Use the commands in the following procedure to test Enable authentication.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa test authentication enable default** *$enab15$ ciscoadmin*	Test the password configured for Administrator mode access to the storage router, using the default user name. AAA authentication uses the services in the default list (Example 9-2).

Example 9-2 Testing Enable Authentication

```
*[SN5428-2-MG1]# aaa test authentication enable default $enab15$ ciscoadmin
Sep 02 14:37:00:aaa:AS_NOTICE :Auth test request being queued

Sep 02 14:37:00:aaa:AS_NOTICE :Auth test request complete, status = pass
```

Login Authentication

Use the commands in the following procedure to test Login authentication.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**aaa test authentication login default** *sysmonitor ciscomonitor*	Test the user name and password configured for Monitor mode access to the storage router. AAA authentication uses the services in the default list (Example 9-3).

Example 9-3 Testing Login Authentication

```
*[SN5428-2-MG1]# aaa test authentication login default sysmonitor ciscomonitor
Sep 02 14:37:00:aaa:AS_NOTICE :Auth test request being queued

Sep 02 14:37:00:aaa:AS_NOTICE :Auth test request complete, status = pass
```

Configuring Two-Way Authentication

When iSCSI authentication is enabled, the SCSI routing instance must authenticate the IP host during the iSCSI TCP connection process. IP hosts that cannot be authenticated are not allowed access to the storage resources. IP hosts may also require authentication of the SCSI routing instance during the iSCSI TCP connection process. If the SCSI routing instance cannot be authenticated, the IP host terminates the connection.

Use the commands in the following procedure to configure a user name and password for a SCSI routing instance that must be authenticated by IP hosts.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **username** *zeusabc*	Assign a user name to the SCSI routing instance. For example, configure the user name *zeusabc* for the SCSI routing instance named *zeus*.
Step 3	**scsirouter** *zeus* **password** *zeus123*	Assign a password to the SCSI routing instance. For example, configure the password *zeus123* for the SCSI routing instance named *zeus*.

Note The SCSI routing instance user name and password pair must also be configured within the authentication database services used by the IP hosts for authentication purposes.

Enabling iSCSI Authentication

iSCSI authentication is enabled for specific SCSI routing instances. By default, iSCSI authentication is not enabled.

Use the commands in the following procedure to enable iSCSI authentication using the AAA authentication methods configured in the specified AAA authentication list.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**scsirouter** *zeus* **authentication** *webservices2*	Enable authentication for the named SCSI routing instance, using the named authentication list. For example, enable authentication for the SCSI routing instances named *zeus*, using the authentication list named *webservices2*.

Verifying and Saving Configuration

You can save the configuration at any time using either the **save aaa bootconfig** or **save all bootconfig** commands. Although AAA configuration changes are effective immediately, you must save the authentication configuration for it to be retained in the SN 5428-2 when it is rebooted.

Use the following procedure to verify and save authentication settings.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show aaa**	Display AAA authentication configuration (Example 9-4).
Step 3	**show scsirouter** *zeus* **brief**	Verify that iSCSI authentication is enabled and (optionally) that the appropriate user name and password are configured for the specified SCSI routing instance. For example, verify that the SCSI routing instance named *zeus* is enabled for authentication using the authentication list named *webservices2* and is configured with the user name *zeusabc* and password *zeus123* (Example 9-5).
Step 4	**save aaa bootconfig**	Save authentication settings.
Step 5	**save scsirouter** *zeus* **bootconfig**	Save the SCSI routing instances.
Step 6	**save all bootconfig**	(Optional) Save all configuration settings. This command may be used in place of individual **save aaa bootconfig** and **save scsirouter bootconfig** commands described in Steps 4 and 5.

Example 9-4 Display AAA Authentication Configuration

```
[SN5428-2-MG1]# show aaa
aaa new-model
username "labserver" password "9 491c083a73d7f89bc0205927d086cdd0d8"
username "labserver2" password "9 5ccd52d543e0d3a5558afe8cbe2867dd41"
radius-server key "9 64ced29a261a8ca554a6f4ea8d494669c1"
radius-server host 10.6.0.53 auth-port 1645
radius-server host 10.6.0.73 auth-port 1645
radius-server host 10.5.0.61 auth-port 1645
tacacs-server key "9 c5fc960c37b1a3ad4d76e2495b169e4b08"
tacacs-server host 10.7.0.22 auth-port 49
tacacs-server host 10.7.0.41 auth-port 49
tacacs-server host 10.7.0.45 auth-port 49
aaa group server radius "janus"
aaa group server radius "janus" server 10.5.0.61 auth-port 1645
aaa group server radius "janus" server 10.6.0.53 auth-port 1645
aaa group server tacacs+ "sysadmin"
aaa group server tacacs+ "sysadmin" server 10.7.0.22 auth-port 49
aaa group server tacacs+ "sysadmin" server 10.7.0.41 auth-port 49
aaa authentication enable default group sysadmin enable
aaa authentication iscsi webservices2 local group janus group tacacs+
aaa authentication login default group sysadmin monitor
```

Example 9-5 Verify iSCSI Authentication for SCSI Routing Instance

```
[SN5428-2-MG1]# show scsirouter zeus brief
SCSI Router Information
...
SCSI Router Authentication Information
Router               Authentication  Username        Password
-------------------- --------------- --------------- --------
zeus                 webservices2    zeusabc         9 5eaee29546ed37f31d5812ea60eaac1568
...
```

CHAPTER 10

Configuring a High Availability Cluster

This chapter explains how to configure SN 5428-2 Storage Routers in a cluster to allow the storage routers to back each other up in case of failure. The following tasks are covered:

- Prerequisite Tasks, page 10-1
- Creating a Cluster, page 10-2
- Joining Stand-alone Storage Routers in a Cluster, page 10-6
- Changing Clusters, page 10-7

High availability clusters can be configured using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Note SN 5428-2 Storage Routers that are deployed for transparent SCSI routing or FCIP cannot participate in a high availability cluster.

Prerequisite Tasks

All storage routers that will participate in a cluster must have connectivity to the same hosts and the same storage systems, and must be connected to each other through their management and HA interfaces.

Note At least one of the interface connections must be live; you cannot connect storage routers in a cluster using cross-over cables.

Guidelines for Configuring SCSI Routing Instances

When you configure SCSI routing instances to run in a high availability cluster, the following operational guidelines apply:

- A cluster supports up to 12 active SCSI routing instances.
- If you map targets using WWPN, be sure to specify both the primary WWPN (the WWPN associated with the storage resource as known to the primary node in the cluster) and the secondary WWPN (the WWPN associated with the storage resource as known to the second node in the cluster).
- Each storage router in a cluster maintains and exchanges information about available resources. Failover by eligibility is enabled by default; HA bases the decision to automatically fail over a SCSI routing instance to another storage router in a cluster based on the Fibre Channel and other resources available to that SCSI routing instance.

  Failover occurs when:

  - All mapped targets are unavailable or a critical resource for the SCSI routing instance is unavailable, and some or all mapped targets would be available from another storage router in the cluster. A critical resource can be a configured Gigabit Ethernet interface, a required Fibre Channel interface, or an internal resource needed to run the SCSI routing instance.
  - Some mapped targets are unavailable and all mapped targets are available on another storage router in the cluster.
  - All mapped targets are available, but another storage router in the cluster also has all targets available and is designated at the primary for the SCSI routing instance.
  - The storage router stops receiving heartbeats from another node within the cluster.

Note If you need more manual control over where a SCSI routing instance runs, you can turn off failover by eligibility on a storage router. If a SCSI routing instance fails over to a storage router that is configured with failover by eligibility turned off, it will continue running on that storage router unless there are no mapped targets available or a critical resource is unavailable. Normal failover resumes when failover by eligibility is turned back on for the storage router where the SCSI routing instance is running.

Creating a Cluster

A high availability cluster is composed of two SN 5428-2 Storage Routers (or one SN 5428-2 and one SN 5428) that back each other up in case of failure. Storage routers in a cluster have connectivity to the same hosts and storage systems, and are connected to each other through their management and HA interfaces. Storage routers in a cluster must be running the same version of software.

The following configuration settings are shared cluster-wide, and when configured on the first storage router in the cluster, will be shared with the other storage router that joins the cluster.

- AAA authentication
- Access lists
- Administrator mode and Monitor mode passwords
- Cluster name
- SCSI routing instances
- VLAN information (VID, VTP mode, domain name, etc.)

To create a cluster, you typically configure a principal storage router (including all cluster-wide settings), and then add a new, unconfigured node or a minimally configured node to the cluster.

Note A minimally configured storage router is one in which the management IP address, system name, and optional network management interfaces have been configured. Other system information, such as HA IP address, DNS, and NTP server may also have been configured. A minimally configured storage router does not have any cluster-wide settings configured.

To create a cluster, perform the following steps:

Step 1 Respond to the prompts from the initial system configuration script, as described in Chapter 2, "First-Time Configuration." This script configures the following settings:

- Management IP address
- System name
- HA configuration mode
- Cluster name
- HA IP address

When prompted to select HA configuration mode, choose *clustered*. When prompted for cluster name, enter the name of the new cluster. At the end of the initial configuration script, the storage router automatically reboots.

Step 2 When the storage router restarts, complete the system configuration using the setup wizard or other CLI commands, as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters," or the web-based GUI.

Step 3 (Optional) If you are participating in Fibre Channel switched fabric zoning with the storage router, complete the configuration for zoning using the procedures described in Chapter 5, "Configuring Fibre Channel Interfaces."

Step 4 Configure all desired SCSI routing instances and access lists, as described in Chapter 6, "Configuring SCSI Routing."

Step 5 Add another storage router to the cluster. To add a new, unconfigured SN 5428-2 to the cluster, follow the additional steps in the "Adding an Unconfigured SN 5428-2 Storage Router" section.

To add a minimally configured SN 5428-2 to the cluster, follow the additional steps in the "Adding a Minimally Configured SN 5428-2 Storage Router" section.

Adding an Unconfigured SN 5428-2 Storage Router

To add a new, unconfigured SN 5428-2 to the existing cluster, perform the following steps:

Step 1 Respond to the prompts from the SN 5428-2 initial system configuration script. When prompted to select HA configuration mode, choose *clustered*. When prompted for cluster name, enter the name of the existing cluster. At the end of the initial system configuration script, the storage router automatically reboots.

Step 2 When the storage router restarts, it communicates with the other member of the cluster to obtain current cluster configuration information. Once the storage router is completely restarted, verify the new cluster configuration. Issue the **show cluster** command to verify the cluster name and confirm that the SN 5428-2 is exchanging heartbeats with the other member of the cluster.

Step 3 To verify that both storage routers in the cluster include the same cluster configuration elements, issue the following commands from the principal storage router in the cluster:

- **show aaa**
- **show accesslist all**
- **show scsirouter all from bootconfig**
- **show vlan**
- **show vtp**

Issue the same commands from the SN 5428-2 just added to the cluster. The displays should be the same.

Step 4 Use the setup configuration wizard, other CLI commands, or the GUI to complete SN 5428-2 configuration. If you are participating in Fibre Channel switched fabric zoning with the storage router, configure for zoning using the procedures described in Chapter 5, "Configuring Fibre Channel Interfaces."

Step 5 (Optional) Save any changes made to the configuration by issuing the appropriate **save** command with the **bootconfig** keyword, which updates the bootable configuration for the SN 5428-2 and notifies all storage routers in the cluster of the configuration changes.

Step 6 (Optional) To divide the workload between the storage routers in the cluster, you can manually fail over selected SCSI routing instances using the **failover scsirouter** command. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about failing over SCSI routing instances.

Adding a Minimally Configured SN 5428-2 Storage Router

To add a minimally configured SN 5428-2 to an existing cluster, perform the following steps:

Step 1 Run the **setup cluster** configuration wizard.

- When prompted to select HA configuration mode, choose **clustered**.
- When prompted for cluster name, enter the name of the existing cluster.
- When prompted, enter the HA IP address for the SN 5428-2. The HA interface for each storage router in a cluster must be on the same IP subnet.
- When prompted to retain or delete "scsirouter" instances, enter **delete**. Deleting means that any existing SCSI routing instances will be deleted from this SN 5428-2. (Since this is a minimally configured SN 5428-2, there should be no SCSI routing instances to delete.)
- Enter **yes** to confirm your changes. The storage router automatically reboots.

Step 2 When the storage router restarts, it communicates with other member of the cluster to obtain current cluster configuration information. Once the storage router is completely restarted, verify the new cluster configuration. Issue the **show cluster** command to verify the cluster name and confirm that the SN 5428-2 is exchanging heartbeats with the other member of the cluster.

Step 3 To verify that both storage routers in the cluster include the same cluster configuration elements, issue the following commands from the principal storage router in the cluster:

- **show aaa**
- **show accesslist all**
- **show scsirouter all from bootconfig**
- **show vlan**
- **show vtp**

Issue the same commands from the SN 5428-2 just added to the cluster. The displays should be the same.

Step 4 Complete additional system configuration of the SN 5428-2 just added to the cluster, as needed. For example:

- Use the **setup netmgmt** configuration wizard to configure the storage router for network management via SNMP.
- Use the **setup time** configuration wizard to configure the storage router date and time, and optional NTP server information.
- Use the CLI or GUI to configure CDP and logging.
- If you are participating in Fibre Channel switched fabric zoning with the storage router, configure for zoning using the procedures described in Chapter 5, "Configuring Fibre Channel Interfaces."

Step 5 Save any changes to the configuration by issuing the appropriate **save** command with the **bootconfig** keyword, which updates the bootable configuration for the SN 5428-2 and notifies all storage routers in the cluster of the configuration changes.

Step 6 (Optional) To divide the workload between the storage routers in the cluster, you can manually fail over selected SCSI routing instances using the **failover scsirouter** command. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about failing over SCSI routing instances.

Joining Stand-alone Storage Routers in a Cluster

In some cases you may prefer to completely configure both storage routers (including SCSI routing instances and access lists) as stand-alone systems before joining them into a cluster.

The following example explains the steps required to create a cluster named *Cluster1*, composed of two SN 5428-2s named *Sys1* and *Sys2*. This example assumes that both SN 5428-2s are fully configured with SCSI routing instances and access lists. Use the **scsirouter primary** command to assign a preferred storage router to any or all of the SCSI routing instances, if desired. See Chapter 6, "Configuring SCSI Routing," for more information about configuring SCSI routing instances.

To create a cluster from fully configured SN 5428-2s, perform the following steps:

Step 1 Use the **setup cluster** configuration wizard to define Sys1 as a member of the cluster Cluster1. When prompted, enter **retain** to keep the access list and SCSI routing instance information already defined.

Step 2 Use the **show cluster** command to verify the cluster name after Sys1 reboots. Verify that all instances and access lists are still available, using **show scsirouter** and **show accesslist** commands.

Step 3 (Optional) When Sys2 joins Cluster1, all cluster elements (access lists, VLANs, passwords and AAA settings) currently configured on Sys2 will be deleted. If you want to make any of the cluster elements currently configured on Sys2 available to the cluster, use the appropriate **save** command to save the elements to a file. For example, to make any of the access lists currently configured on Sys2 available to the cluster, use the **save accesslist** command to save the access lists to a file. The following command saves all access lists to a file named *Sys2_AccessLists*:

```
[Sys2] save accesslist all Sys2_AccessLists
```

Step 4 (Optional) Because cluster elements can only be manipulated from the first storage router in a cluster, the saved configuration file(s) from Sys2 must be made available to Sys1. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about managing saved configuration files using either the **copy savedconfig** command or FTP.

Step 5 Join Sys2 to the new cluster named Cluster1, using the **setup cluster** configuration wizard. When prompted, enter **retain** to share the existing SCSI routing instances across the cluster.

Step 6 Use the **show cluster** command to verify the cluster name after Sys2 reboots. Verify that the defined SCSI routing instances were retained, using **show scsirouter** command.

Step 7 (Optional) Restore the cluster elements (such as access lists) saved in Step 3 using the appropriate **restore from** command. Cluster elements can only be manipulated from the first storage router in a cluster, so these commands must be issued from the system Sys1. For example, to restore all access lists from the configuration file named *Sys2_AccessLists* saved in Step 3:

```
[Sys1] restore accesslist all from Sys2_AccessLists
```

Note Restoring AAA or VLAN information overwrites any existing information. You may prefer to make the configuration modifications to the storage router currently in the cluster before adding the new member.

Step 8 (Optional) Save all configuration information on system Sys1 by issuing a **save all bootconfig** command, which updates the bootable configuration of all storage routers in the cluster with the saved cluster configuration elements.

Step 9 Verify that all SCSI routing instances are active using the **show scsirouter stats** command on both storage routers.

Changing Clusters

In some situations, you may need to move a storage router from one cluster to another cluster. Moving a fully configured storage router from one cluster to another is more complex than simply adding it to a cluster. Advanced planning is required.

To successfully move a storage router from one cluster to another, perform the following steps:

Step 1 Verify that the storage router to be moved has the same hardware configuration as the other storage router in the cluster you are planning to join. Each node in the cluster must have connectivity to the same IP hosts and Fibre Channel storage. All management interfaces and all HA interfaces for the storage routers within a cluster must be on the same IP subnet; however, the management interfaces must be on a different IP network than the HA interfaces.

Step 2 Decide if you need to retain any of the SCSI routing instances that are configured on the storage router joining the cluster. Retaining data means all SCSI routing instances existing on the storage router joining the cluster will be added to those already configured for the cluster. If the existing instances are not retained, they are deleted.

Step 3 If you are going to retain data, determine if you have any duplicate SCSI routing instance names. When a storage router is added to the cluster, the data in the cluster will overwrite the existing data. You may prefer to change the configuration in the storage router before it joins the cluster to prevent this situation.

Step 4 If you are going to retain data, determine if you need to save existing access list information, or other cluster elements (such as VLANs or AAA configuration). Cluster elements are not retained. Any access lists, VLANs or AAA configuration on the storage router will be discarded when it joins the new cluster. The storage router will also learn Administrator mode and Monitor mode passwords from the cluster.

You can save cluster elements, such as access list information, and then restore them to the cluster. Cluster element information can be restored before or after the storage router joins the cluster by transferring the saved configuration file to the first storage router in the cluster and performing the appropriate restore functions.

Note Restoring AAA or VLAN information overwrites any existing information. You may prefer to simply make the appropriate configuration modifications to the storage router currently in the cluster before adding the new member.

Step 5 Use the **setup cluster** configuration wizard to join the new cluster. Respond to the prompts to retain or delete configuration as required. The storage router automatically reboots at the end of the configuration wizard.

Step 6 Perform any additional configuration that may be needed. For example, you can fail over SCSI routing instances to this new cluster member to balance traffic load between all storage routers in the cluster.

Step 7 After making configuration changes, use the **save all** command with the **bootconfig** keyword to copy and save the storage router configuration, thereby updating the cluster.

CHAPTER 11

Maintaining and Managing the SN 5428-2 Storage Router

This chapter explains how to perform normal maintenance and management tasks associated with the Cisco SN 5428-2 Storage Router. The following tasks are covered:

- Prerequisite Tasks, page 11-2
- Installing Updated Software, page 11-2
- Backing Up System Configuration, page 11-7
- Restoring from Backups, page 11-8
- Powering Down the SN 5428-2 Storage Router, page 11-16
- Resetting the System, page 11-17
- Recovering Passwords, page 11-19
- Controlling SCSI Routing Instances in a Cluster, page 11-20
- Managing CDP on the SN 5428-2 Storage Router, page 11-27
- Using Scripts to Automate Tasks, page 11-28
- Using the SN 5428-2 Logging Facilities, page 11-29
- Gathering Troubleshooting Information, page 11-33

SN 5428-2 Storage Router maintenance and management tasks can be performed using CLI commands, as described in this chapter, or via the web-based GUI. To access the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access online help for the GUI.

Note Not all maintenance and management tasks are appropriate for all storage routers. For example, tasks related to high availability clusters (such as failover of SCSI routing instances) are not necessary for storage routers configured as standalone systems, or deployed for transparent SCSI routing or FCIP.

Prerequisite Tasks

Before performing any of the storage router maintenance tasks, make sure you have configured system parameters as described in Chapter 2, "First-Time Configuration," or Chapter 3, "Configuring System Parameters."

Note Certain configuration tasks, such as identifying a location from which to download software, are optional and may not have been performed during initial configuration. You may perform these tasks at any time, via the CLI or the GUI. Where necessary, this chapter will identify the relevant tasks and commands.

Installing Updated Software

The SN 5428-2 Storage Router is designed to run on a continual basis without significant maintenance. However, from time to time, you may need to install updated software.

The SN 5428-2 stores software images (along with configuration files, log files, and other information) on a local file system. This file system is stored on an internal, non-volatile Flash disk. The **show software version all** command displays a list of all software versions stored on the SN 5428-2 and the amount of disk space available for additional software.

Cisco.com provides registered users access to SN 5428-2 Storage Router software updates. You can download updated software directly to the SN 5428-2 from Cisco.com via standard HTTP, or via HTTP using a proxy server. See the "Obtaining Technical Assistance" section on page xiii for details on using Cisco.com.

You can also use a standard browser to download software updates and associated readme files from Cisco.com to a location of your choosing. Using the CLI or the web-based GUI, you can then make the software available from this location (known as the "download location") to the storage router via HTTP, HTTP using a proxy server, or Trivial File Transport Protocol (TFTP).

If you plan to use the CLI **download software http** or **download software proxy** commands to make the updated software available to the storage router, the machine hosting the download location must be running a web server.

If you plan to use the CLI **download software tftp** command, the machine must be accessible using the Trivial File Transport Protocol.

If the machine is not running a web server or accessible via TFTP, use the web-based GUI to make the updated software available to the storage router. (See the online Help for details.)

The download location used for retrieving updated SN 5428-2 software is set using the **software http url**, **software proxy url**, or the **software tftp** commands. To view the download location currently specified, use the **show software version all** command. The resulting display (Example 11-1) identifies the HTTP URL, Proxy URL, and TFTP host name and other information used to identify the download location, the current version of software running on the storage router, and the version that will be used at system restart. In the example, all default locations and related user names and passwords are set.

Example 11-1 Results of "show software version all" Command

```
[SN5428-2_A01]# show software version all

Version               Boot  Hash  Sign  Crash       Size   Date
--------------------  ----  ----  ----  -----  ----------  --------------------
3.3.0.23-K9           OK    OK    N/A       0  10101.0 KB  Feb 25 11:38 CDT 2003
3.3.1-K9              OK    OK    N/A       0  11102.0 KB  Feb 29 15:44 CDT 2003

             Http Url: http://www.cisco.com
          Http Username: SWAdmin01
          Http Password: *********

          Proxy Address: 10.1.12.32
             Proxy Port: 3122
              Proxy Url: http://www.cisco.com
         Proxy Username: SWAdmin01
         Proxy Password: *********

          Tftp Hostname: 10.1.1.122
         Tftp Directory:

Software Space Available: 33264.0 KB
         Current Version: 3.3.1-K9
            Boot Version: 3.3.1-K9
```

To install updated SN 5428-2 software, perform the following steps:

Step 1 (Optional) Identify the location from which to retrieve the updated SN 5428-2 software. (This is either Cisco.com or another download location of your choosing, as previously described.)

Step 2 Make the selected version of software available on the SN 5428-2 local file system.

Step 3 (Optional) Set the new version as the version to be booted during the next system restart, and reboot the SN 5428-2.

Note Always review the README file before making updated software available to the SN 5428-2.

Specifying the Location to Retrieve Updated Software

You must specify the location from which to retrieve updated software. If the current download location is not appropriate, you can reset it.

Use the following procedures to specify the desired download location:

- Using HTTP, page 11-4
- Using Proxy Services, page 11-4
- Using TFTP, page 11-4

When you are finished, verify the new settings using the **show software version all** command, then save them using the **save system bootconfig** or **save all bootconfig** command.

Note If you use the URL, http://www.cisco.com, as the default download location, the username and password must be the same as your Cisco.com login ID and password.

Using HTTP

Use the following procedure to specify the HTTP download location.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**software http url** *http://10.1.11.32/software/sn5428-2*	Configure the default download location. For example, set the download location to *http://10.1.11.32/software/sn5428-2*.
Step 3	**software http username** *webadmin* **password** *webword*	(Optional) Define the user name and password needed to access the selected location. For example, specify user name *webadmin* and password *webword*. If no user name and password are required, use the keyword **none** (for example, **software http username none**).

Using Proxy Services

Use the following procedure to specify a download location via proxy services.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**software proxy url** *http://www.mystoragenet.com*	Configure the default download location. For example, set the download location to *http://www.mystoragenet.com*.
Step 3	**software proxy address** *http://10.1.10.126* **port** *32*	(Optional) Identify the address and port number of the proxy server that will be used to access the URL specified in Step 3 (for example, *http://10.1.10.126*, port *32*).
Step 4	**software proxy username** *Ciscouser* **password** *Ciscopswd*	(Optional) Define the user name and password needed to access the selected download location. For example, specify user name *Ciscouser* and password *Ciscopswd*. If no user name and password are required, use the keyword **none** (for example, **software proxy username none**).

Using TFTP

Use the following procedure to specify the TFTP download location.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**software tftp hostname** *TFTPHost1* **directory** */myTFTP*	Configure the default download host and optional base directory. For example, set the host name to *TFTPHost1* and the base directory to */myTFTP*. **Note** If the storage router is not configured to use the services of a DNS, enter the IP address of the TFTP host. If the base directory is *tftpboot*, omit the directory keyword.

Downloading Updated Software

The **download software** command makes a new version of software available to the storage router for boot purposes. You can store two versions of software on the SN 5428-2. Before attempting to download updated software, verify that only a single version of software exists on the storage router. If two versions exist, use the **delete software version** command to delete the old version of software to make room for the new version.

Use the following procedures to make a new version of software available to the storage router:

- Using HTTP, page 11-5
- Using Proxy Services, page 11-5
- Using TFTP, page 11-5

Note Before downloading software, issue the **show system** command and verify that there is sufficient free space available. The software space available is shown in kilobytes; the size of the typical download is between 25 and 30 MB.

Using HTTP

Use the following procedure to make a new version of software available to the SN 5428-2 via HTTP.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**download software http version** *3.3.1-K9*	Download a new software version to the storage router (for example, *3.3.1-K9*).

Using Proxy Services

Use the following procedure to make a new version of software available to the SN 5428-2 via proxy services.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**download software proxy version** *3.3.1-K9*	Make a new software version available to the storage router (for example, *3.3.1-K9*).

Using TFTP

Use the following procedure to make a new version of software available to the SN 5428-2 via TFTP.

Note While the size of the software file may vary, it will exceed 16MB. Some older TFTP implementations have a 16MB download limitation.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**download software tftp version** *3.3.1-K9*	Make a new software version available to the storage router (for example, *3.3.1-K9*).

Downloading from a Special Location

There may be times when you need to make special software available to the storage router, for example, under the guidance of a Cisco Technical Support professional.

If you isolate this software from standard updates by placing it in another location (not the default download location), you could change the default download location, download the software, and then reset the default download location.

An easier way, however, is to specify the download location as a parameter on the appropriate **download software** command.

- To download a file named *331-K9.tar* from http://your.website.com/sn5428-2 via HTTP, issue this command:

  ```
  download software http url http://your.website.com/sn5428-2/331-K9.tar
  ```

- To download a file named *331-K9.tar* from http://your.website.com/sn5428-2 using the services of a proxy server, issue this command:

  ```
  download software proxy url http://your.website.com/sn5428-2/331-K9.tar
  ```

- To download a file named *331-K9.tar* from *my_tftpHost* using TFTP, issue this command. The 321-K9.tar file must reside in the default base directory defined for the TFTP host.

  ```
  download software tftp hostname my_tftpHost filename 331-K9.tar
  ```

Setting Updated Software as Boot Version

Downloading updated software to the storage router does not change the currently running version of the software, nor does it automatically set the new version to be booted at next system restart. You must take specific action to make the new software version bootable.

Setting software as the bootable version consists of verifying the software integrity and performing internal checks to ensure that the storage router can boot the specified version of software.

Use the following procedure to set the new software as the version to be booted.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**software version** *3.3.1-K9*	Select the software to be booted when the system next starts (for example, boot *3.3.1-K9* when the system restarts). The system checks the integrity of the specified software version to be sure that it is bootable.

	Command	Description
Step 3	**show software version boot**	Verify that the correct version is shown as the bootable version (identified as *Boot Version*).
Step 4	**reboot**	When you are ready to run the new software version, restart the storage router.

Precautions for Cluster Environments

In a cluster environment, the **software version** command may temporarily suspend normal HA communications, while internal checks are made to ensure that the new software can be run. A suspension will cause a failover of any SCSI routing instances active on the storage router.

Any instances with the **primary** attribute set to the name of the SN 5428-2 will resume running on the storage router after it is rebooted or after normal HA communications are restored.

If the storage router is running in a cluster environment, issuing the **reboot** command will attempt failover for all SCSI routing instances to another storage router in the cluster. The iSCSI drivers handle reconnection of users to the appropriate storage resources, minimizing the effects of the reboot sequence on those users.

Backing Up System Configuration

Backing up the system configuration consists of saving selected storage router configuration information to XML files that can be stored both locally and remotely. Should problems occur, AAA authentication information, access lists, Fibre Channel (FC) interface and switch configuration, SCSI routing instances, FCIP instances, VLANs and other storage router system configuration information can be restored from these files. See Chapter 12, "Command Line Interface Reference," for more information about what configuration data is saved.

While you can issue a **save** command at any time during a CLI command session, best practices suggest that you should back up the storage router system configuration to a file on a regular basis.

Configuration files are maintained in the *savedconfig* directory on the SN 5428-2. You can use the **copy** command to copy the configuration file to a server running TFTP, allowing you to integrate the storage router backups with other software archives.

By accessing the web-based GUI from a remote server, you can create storage router backup files directly on that server. See the GUI online help for details.

Note See Chapter 12, "Command Line Interface Reference," for more information about using the **save** and **copy** commands.

Creating Local Backups

Local backups allow you to store the resulting XML configuration file in the *savedconfig* directory on the SN 5428-2.

Use the following procedure to perform a local backup that saves the storage router system configuration to a file named *mybackup* in the *savedconfig* directory.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**save system** *mybackup*	Save the storage router system configuration information to a file named *mybackup*.

Storing Backups to a Remote TFTP Server

Use the following procedure to create a backup configuration file named *backup1* and to copy that backup file to another file named *back1.temp*, located on the TFTP host, *tftpserver1*, in the default directory, */tftpboot*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**save all** *backup1*	Save the current running configuration to a file called *backup1* in the *savedconfig* directory.
Step 3	**copy savedconfig:***backup1* *tftp://tserver1/back1.temp*	Copy the saved configuration file, *backup1*, to a file called *back1.temp*, located on the TFTP server, *tserver1*, in the default directory. **Note** The *back1.temp* file must already exist in the default directory with the appropriate permissions that allow it to be overwritten. You cannot create a new file using TFTP.

Restoring from Backups

AAA authentication information, access lists, FC interface and switch configuration, SCSI routing instances, FCIP instances, VLANs, and selected system configuration data can be restored from previously saved configuration files. You may choose to restore selected data such as a specific SCSI routing or FCIP instance, or all available configuration data, using the **restore** command with the **from** keyword.

The file from which configuration is restored must reside in the *savedconfig* directory (*/ata3/savedconfig*). If you need to restore configuration data from a backup file existing elsewhere in the network, use the **copy** command to make the desired file available in the *savedconfig* directory.

Restoring configuration data copies all or part of the contents of the specified file into persistent memory; it does not always change the storage router's running configuration. For example, the configuration of a restored SCSI routing instance may only be completely visible via the **show scsirouter** command using the **from bootconfig** keywords until the instance has been restarted. A restored FCIP instance, however, is automatically enabled and the storage router running configuration is updated.

Note The configuration information available for restoration depends on the deployment of the SN 5428-2 Storage Router.

Restoring a Deleted SCSI Routing Instance

For example, suppose the SCSI routing instance, *scsi1*, was inadvertently deleted. Use the following procedure to restore *scsi1* from a configuration file that was saved to a URL.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**copy** *http://10.1.1.44/~s1/back1* **savedconfig:***scsi1_restore*	Copy the specified configuration file from the designated URL and place it in the *savedconfig* directory, using the file name, *scsi1_restore*.
Step 3	**show savedconfig**	Verify that the imported file now exists in the *savedconfig* directory.
Step 4	**show scsirouter all from** *scsi1_restore*	Verify that the SCSI routing instance exists in this configuration file.
Step 5	**restore scsirouter** *scsi1* **from** *scsi1_restore*	Restore the SCSI routing instance from the specified file.
Step 6	**show scsirouter** *scsi1* **from bootconfig**	Display the restored SCSI routing instance to verify that the configuration is as expected.
Step 7	**scsirouter** *scsi1* **enable**	Start the restored SCSI routing instance, updating the running configuration of the storage router. Once the instance has been restored and restarted, modifications to its configuration can also be made.
Step 8	**save scsirouter** *scsi1* **bootconfig**	(Optional) If changes are made to the SCSI routing instance configuration, save the SCSI routing instance to the storage router bootable configuration.

Restoring an Existing SCSI Routing Instance

If you need to restore the configuration of a SCSI routing instance that is still active in the storage router, you must stop the instance, restore the configuration from the selected file, and then restart the instance. For example, use the following procedure to restore the SCSI routing instance, *scsi2*, from the file, *scsi2_backup*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show scsirouter** *scsi2* **brief**	Display current status of the SCSCI routing instance. If the status is active, proceed with Step 3 to stop the instance. Otherwise, continue with Step 4.
Step 3	**no scsirouter** *scsi2* **enable**	(Optional) Disable an active SCSI routing instance. You cannot restore an active instance.
Step 4	**show scsirouter all from** *scsi2_backup*	(Optional) Verify that the instance saved in the configuration file is the one you want to restore. The named configuration file must exist in the *savedconfig* directory.
Step 5	**restore scsirouter** *scsi2* **from** *scsi2_backup*	Restore the SCSI routing instance.
Step 6	**show scsirouter** *scsi2* **from bootconfig**	Confirm that the configuration of the SCSI routing instance is now correct.
Step 7	**scsirouter** *scsi2* **enable**	Restart the SCSI routing instance.

	Command	Description
Step 8	**show scsirouter** *scsi2*	(Optional) Verify the configuration of the restored and restarted SCSI routing instance. The running configuration should now match the restored permanent configuration. Once the instance has been restored and restarted, modifications to its configuration can also be made.
Step 9	**save scsirouter** *scsi2* **bootconfig**	(Optional) If changes are made to the SCSI routing instance configuration, save the restored SCSI routing instance to the storage router bootable configuration.

Restoring a Deleted FCIP Instance

For example, suppose the FCIP instance, *fcip1*, was inadvertently deleted. Use the following procedure to restore *fcip1* from a configuration file named *fcip1_backup*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show fcip all from** *fcip1_backup*	(Optional) Verify that the FCIP instance exists in this configuration file. The configuration file must exist in the *savedconfig* directory.
Step 3	**restore fcip all from** *fcip1_backup*	Restore the FCIP instance from the specified file.
Step 4	**show fcip** *fcip1*	(Optional) Display the restored FCIP instance to verify that the configuration is as expected.

Restoring an Existing FCIP Instance

If you need to restore the configuration of an FCIP instance that is still active in the storage router, you must stop the instance and then restore the configuration from the selected file. The restore process starts the instance. For example, use the following procedure to restore the FCIP instance, *fcip2*, from the file *fcip2_backup*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**no fcip** *fcip2* **enable**	Disable the active FCIP instance. You cannot restore an active instance.
Step 3	**show fcip** *fcip2* **from** *fcip2_backup*	(Optional) Verify that the FCIP instance exists in this configuration file. The configuration file must exist in the *savedconfig* directory.
Step 4	**restore fcip** *fcip2* **from** *fcip2_backup*	Restore the FCIP instance from the specified file.
Step 5	**show fcip** *fcip2*	(Optional) Display the restored FCIP instance to verify that the configuration is as expected.

Restoring AAA Authentication Information

When you restore AAA authentication information, the following configuration settings are updated:

- AAA authentication lists
- The user names and passwords in the local username database
- Radius servers, server groups, and associated server, group and global authentication port, retransmit, time-out, deadtime and key values
- TACACS+ servers, server groups, and associated server and global authentication port, time-out, and key values.

Use the following procedure to restore the AAA authentication configuration that exists in the saved configuration file *aaa_backup*.

Note In a cluster environment, AAA configuration functions are handled by a single node in the cluster. If you issue an AAA command from a storage router that is not performing AAA configuration functions, the CLI displays an informational message with the name of the storage router that is currently handling those functions.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show savedconfig** *aaa_backup*	Display the contents of the backup file, and verify that this is the AAA authentication configuration that you want to restore. The file must exist in the *savedconfig* directory.
Step 3	**restore aaa from** *aaa_backup*	Restore the AAA authentication from the saved configuration file.
Step 4	**show aaa**	Display the AAA authentication information and verify that it is now correct.
Step 5	**save aaa bootconfig**	(Optional) If you make any changes to the restored AAA authentication configuration, save the changed configuration to the storage router bootable configuration.

Restoring an Access List

When you restore an access list, existing entries are never deleted. The restore will add missing entries and overwrite entries of the same name, but will never purge or delete existing entries. If necessary, you can delete an entire access list and then restore if from a saved configuration file.

Use the following procedure to restore the access list named *mylist* from the file named *accesslist_backup*.

In this example, the access list named *mylist* in the running configuration contains the following entries:

- 10.1.1.30/32
- 172.16.255.220/32
- chap-username 12h7b.lab2.webservices
- chap-username 12784.lab1.webservices

The saved access list in the configuration file named *accesslist_backup*, contains these entries:

- 209.165.200.225/32
- 10.1.1.30/32
- chap-username 12h7b.lab2.webservices
- chap-username test2.sys3

Note In a cluster environment, access lists management functions are handled by a single node in the cluster. If you issue an access list command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the storage router that is currently handling those functions.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show accesslist** *mylist*	Display the current entries associated with the access list.
Step 3	**show accesslist** *mylist* **from** *accesslist_backup*	Display the entries associated with the access list saved in the configuration file. The configuration file must exist in the *savedconfig* directory.
Step 4	**restore accesslist** *mylist* **from** *accesslist backup*	Restore the access list entries from the saved configuration file.
Step 5	**show accesslist** *mylist*	Display the entries for the restored access list. The entries are: • 10.1.1.30/32 • 172.16.255.220/32 • 209.165.200.225/32 • chap-username 12h7b.lab2.webservices • chap-username 12784.lab1.webservices • chap-username test2.sys3
Step 6	**save accesslist** *mylist* **bootconfig**	(Optional) If any entries prior to the restore were not saved, issue the **save** command to save the current access list configuration to the storage router bootable configuration.

Restoring Fibre Channel Interface and Switch Configuration

You can restore zoning information and both global and interface-specific FC configuration information. You can restore the following settings:

- Global FC settings, including time out values and domain ID
- FC interface configuration, including link speed and port type settings, for all FC interfaces
- All alias, zone and zone set configuration

Use the following procedure to restore all saved global and FC interface configuration information. In this example, the global and interface-specific FC configuration information will be restored from the saved configuration file named *fcswitch_backup*.

Note Restoring global FC settings, such as the domain ID, in an operational fabric may cause traffic disruptions.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**no interface** *fc1* **enable** **no interface** *fc4* **enable**	(Optional) Remove the storage router from the switched fabric by disabling all FC interfaces operating as E_Ports. For example, disable the FC interfaces *fc1* and *fc4*.
Step 3	**show savedconfig** *fcswitch_backup*	Display the contents of the saved configuration file and verify that this is the FC configuration information that you want to restore (Example 11-2). The file must exist in the *savedconfig* directory.
Step 4	**restore fcswitch all from** *fcswitch_backup*	Restore all FC configuration information from the saved configuration file. **Note** Zoning information is not restored with a **restore fcswitch all** command. You must explicitly enter a **restore fcswitch zones** command to restore the zoning database. See Chapter 12, "Command Line Interface Reference," for more information about restoring zones.
Step 5	**show fcswitch** **show interface all**	Display all FC configuration information and verify that it is correct.
Step 6	**interface** *fc1* **enable** **interface** *fc4* **enable**	(Optional) Rejoin the switched fabric by enabling the FC interfaces operating as E_Ports. Any relevant changes to the FC configuration, such as the domain ID, will be propagated to the fabric. For example, enable the FC interfaces *fc1* and *fc4*.
Step 7	**save fcswitch bootconfig**	(Optional) If you make any changes to the restored FC configuration, save the changed configuration to the storage router bootable configuration.

Example 11-2 Show FC Configuration from Saved Configuration File

```
!
! FC SWITCH
!
fcswitch ratov 10000
fcswitch edtov 2000
fcswitch dstov 5000
fcswitch fstov 1000
fcswitch zoning default all
fcswitch zoning autosave enable
fcswitch zoning merge SW2
fcswitch domainid 1 force
no fcswitch domainid lock enable
fcswitch interop-credit 12
!
...
```

```
! FC PORTS
!
interface fc1 enable
interface fc1 ms-enable enable
no interface fc1 al-fairness enable
interface fc1 fan-enable enable
interface fc1 ext-credit 0
interface fc1 mfs-bundle enable timeout 10
interface fc1 linkspeed auto
interface fc1 type gl-port
!
...
!
interface fc8 enable
interface fc8 ms-enable enable
no interface fc8 al-fairness enable
interface fc8 fan-enable enable
interface fc8 ext-credit 0
interface fc8 mfs-bundle enable timeout 10
interface fc8 linkspeed auto
interface fc8 type gl-port
```

Restoring VLANs

You can restore specific VLANs or all VLANs. When you restore a VLAN, the VTP mode is also restored.

Use the following procedure to restore a VLAN. In this example, VLAN *10* (named *TestLab*) will be restored from the saved configuration file named *VLAN_backup*.

Note In a cluster environment, VLAN management functions are handled by a single node in the cluster. If you issue a VLAN command from another storage router in the cluster, the CLI displays an informational message with the name of the storage router that is currently handling those functions.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show vlan** *10* **from** *VLAN_backup*	Verify that the saved configuration file contains the VLAN configuration information that you want to restore.
Step 3	**restore vlan** *10* **from** *VLAN_backup*	Restore VLAN *10* from the saved configuration file.
Step 4	**show vlan**	Verify that the VLAN is restored and the configuration is correct.
Step 5	**show vtp**	Verify that the VTP configuration is correct.
Step 6	**save vlan** *10* **bootconfig**	(Optional) If you make any configuration changes to the VLAN after restoration, save the changes to the storage router bootable configuration.

Restoring System Configuration

You can restore selected system information using the **restore system** command. You can restore the following information:

- Administrator contact settings
- CDP configuration
- DNS configuration
- IP address of remote syslog host
- NTP server and date, time, and time zone settings
- Restrict service setting for all interfaces
- Session timeout value for management sessions
- Event message logging table
- Routing table and RIP settings
- SNMP network management configuration
- Software default download locations and associated user names and passwords
- Secure Shell (SSH) configuration settings and session timeout value

Use the following procedure to restore system configuration information. In this example, SNMP network management configuration and administrator contact settings will be restored from the saved configuration file named *system_backup*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show savedconfig** *system_backup*	Display the contents of the saved configuration file and verify that the file contains the information that you want to restore.
Step 3	**restore system snmp from** *system_backup*	Restore SNMP network management configuration.
Step 4	**show snmp**	Verify that the SNMP network management information is restored and that the configuration is correct (Example 11-3).
Step 5	**restore system contactinfo from** *system_backup*	Restore administrator contact settings.
Step 6	**show admin**	Verify that the administrator contact information is restored and that the configuration is correct (Example 11-4).
Step 7	**save system bootconfig**	(Optional) If you make any changes to the SNMP configuration or administrator contact information after the restoration, save the changes to the storage router bootable configuration.

Example 11-3 Verify SNMP Configuration

```
[SN5428-2_PR1]# show snmp
First Trap Host: 10.1.32.200
Second Trap Host: 10.2.12.242
Get Community String: public
Set Community String: private
Send Authentication Traps: enabled
Send Entity FRU Traps: enabled
Link Up/Down Enable for mgmt: enabled
Link Up/Down Enable for ha: enable
Link Up/Down Enable for fc1: enabled
Link Up/Down Enable for fc2: enabled
Link Up/Down Enable for fc3: enabled
Link Up/Down Enable for fc4: enabled
Link Up/Down Enable for fc5: enabled
Link Up/Down Enable for fc6: enabled
Link Up/Down Enable for fc7: enabled
Link Up/Down Enable for fc8: enabled
Link Up/Down Enable for ge1: enabled
Link Up/Down Enable for ge2: enabled
System location is: Test lab
```

Example 11-4 Verify Administrator Contact Information

```
[SN5428-2_PR1]# show admin
Administrator Contact Information
         Name: Pat Hurley
        Email: phurley@abc123z.com
        Phone: 123.456.7890
        Pager: 123.456.3444 pin 2234
```

Powering Down the SN 5428-2 Storage Router

If you need to make changes to the physical location or cabling of the storage router, you may need to schedule a time to power down the unit.

Use the following procedure to properly power down a storage router. These steps assure that the file system is in the appropriate state prior to shutdown.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**halt**	Respond to any prompts to save information as desired. The SN 5428-2 can be safely powered down when the [HALTED]# command prompt appears.

Resetting the System

There may be times when you need to return some or all of the storage router configuration to factory defaults, for example, when moving a system between environments (such as test and production) or for troubleshooting purposes.

To reset the SN 5428-2 Storage Router, perform the following steps:

Step 1 (Optional) Save existing configuration information to a file.

Step 2 Clear the current configuration and restore some or all factory defaults, using the **clear conf** command.

Note If the SN 5428-2 is operating in a cluster environment, any SCSI routing instances running on this storage router fail over to another storage router in the cluster. If you are operating in a cluster environment but do not want SCSI routing instances to fail over, issue the **no scsirouter enable** command for all instances (or selected instances that should not fail over) before you issue the **clear conf** command. (This will permanently delete the SCSI routing instances from the cluster.) See "Controlling SCSI Routing Instances in a Cluster" for more information about operating the SN 5428-2 in a cluster environment.

Step 3 (Optional) Run the initial configuration script to configure the management interface and other required parameters via an EIA/TIA-232 console connection.

Step 4 Restore specific configuration information or reconfigure the storage router using CLI commands or the web-based GUI.

Reset All to Factory Defaults

The following procedure clears the storage router and returns most settings to factory defaults. For example, use this procedure if an existing storage router is to be physically moved to another environment, and it is not necessary to retain any current configuration information, because the system setup will be completely different.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**clear conf** or **clear conf all** *cisco*	Clear the current system configuration, including network management information. If the storage router is deployed for SCSI routing, you can use the **clear conf** wizard. At the prompt, enter the Administrator password. Enter **all** to erase system configuration and management port settings, and all saved configurations and SCSI routing instances (Example 11-5). If the storage router is deployed for transparent SCSI routing or FCIP, enter the **clear conf all** command, followed by the Administrator password (for example, *cisco*). This command is also available in storage routers deployed for SCSI routing. After either command completes, the storage router automatically reboots.

After the move, use the EIA/TIA-232 console connection to configure the management interface IP address and other required system information. Then continue configuration of the storage router via the **setup** configuration wizards or other CLI commands, or via the web-based GUI.

See Chapter 2, "First-Time Configuration," for more information about initial system configuration.

Example 11-5 Reset SN 5428-2 Storage Router Configuration

```
Enter admin password: *****
This process can restore factory default settings for the SN5428-2.
* Select "apps" to remove active applications and retain system
  configuration settings.
* Select "system" to remove active applications and system
  configuration settings.
* Select "saved" to remove all backup configurations from disk.
* Select "all" to remove active applications, system configuration,
  and saved configurations.
The system configuration includes the management port, dns, admin and
monitor login, ntp, and snmp. You will need to use the console
to reconfigure the management port if you erase the system configuration.

The system will reboot if you select "apps", "system", or "all".
Erase what? [apps/system/saved/all/cancel (cancel)]
```

Reset and Retain System Settings

If the storage router is deployed for SCSI routing, you can clear the current configuration but retain the existing system configuration. The following procedure retains the system configuration and saved configuration files over the system reset. For example, use this procedure if you need to use an existing storage router for testing purposes and then restore its current configuration.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**save all** *myfile*	Save all configuration information in a file called *myfile*. This file is stored in the *savedconfig* directory.
Step 3	**clear conf**	Clear the current configuration but retain system information (such as management and HA interfaces, logging table, DNS, Administrator and Monitor passwords, NTP server, and SNMP information) and saved configuration files. At the prompt, enter the Administrator password. Enter **apps** to retain system configuration settings. After the command completes, the storage router automatically reboots. Perform the required user testing. When finished, continue with Step 4 to restore the original configuration.
Step 4	**restore all from** *myfile*	Restore original configuration, which was retained over the **clear conf** command.
Step 5	**reboot**	Reboot to restore the original application configuration into running memory.

Reset to Remove Saved Configuration Files

The following procedure removes previously saved configuration files from the storage router. The system configuration, management information, and SCSI routing instances remain unchanged. For example, use this procedure if a stand-alone storage router has joined a cluster and adopted the new cluster's configuration.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**clear conf**	Remove all saved configuration files from the *savedconfig* directory. At the prompt, enter the Administrator password. Enter **saved** to retain system configuration settings. All files are removed from the *savedconfig* directory. After the command completes, the system prompt displays. (The storage router does not reboot.)
Step 3	**show savedconfig**	Verify that all files have been removed from the *savedconfig* directory.

Note You can also use the **delete savedconfig** command to delete selected saved configuration files from the *savedconfig* directory. The **delete savedconfig** command is available regardless of deployment option.

Recovering Passwords

The storage router management interface is password protected. You must enter passwords when accessing the storage router for management purposes via Telnet, SSH or the web-based GUI. Password protection can also be enabled for the console interface, thereby requiring that the same Administrator and Monitor mode passwords that are configured for the management interface be applied to the console interface.

If the passwords have been enabled for the console interface and are lost, you can recover management access to the storage router using the password recovery procedure. The password recovery procedure requires physical access to the storage router console and can be found at the following URL:

http://www.cisco.com/warp/public/474/

Controlling SCSI Routing Instances in a Cluster

It is important to know where SCSI routing instances are running. While automatic failover capabilities keep the high availability cluster operational in times of system difficulties, manual HA controls provide the ability to distribute SCSI routing instances between the storage routers in a cluster to meet your specific network requirements.

The following are typical activities involved with controlling SCSI routing instances in a cluster environment. While most of these activities are performed infrequently, some (such as viewing operational statistics) may be performed on a regular basis.

- Making Changes to Instance Configurations, page 11-20
- Enabling and Disabling Connections, page 11-21
- Stopping & Starting Instances, page 11-23
- Viewing Operational Statistics, page 11-23
- Handling Failover, page 11-23

Making Changes to Instance Configurations

Note To assure that changes are correctly propagated to all storage routers within a cluster, always modify the configuration of a SCSI routing instance from the node where the instance is currently active.

From time to time, you will make changes to the SCSI routing instance configurations. Changes include such actions as adding or deleting a target, adding or deleting a LUN, remapping a target, or modifying access. It is important to understand the ramifications of these changes on the IP hosts accessing the associated storage resources.

For example, changing the instance configuration may change the device presentation to the IP host, effectively changing the name or number assigned to the device by the host operating system. Certain instance configuration changes, such as adding or deleting targets, adding or deleting LUNs within a particular target, or adding or deleting entire instances may change the order of the devices presented to the host. Even if the host is only associated with one SCSI routing instance, the device order could make a difference.

Typically, the IP host operating system assigns drive identifications in the order they are received based on certain criteria. For example, a Linux system assigns drive identifications in the order they are received based on host, bus, target, and LUN information. Changing the order of the storage discovery may result in a changed drive identification. Applications running on the host may require modification to appropriately access the current drives.

Other actions, such as deleting a named target and subsequently remapping that target using the same target name, result in a change to the iSCSI Name associated with the device. This also causes device presentation difficulties for the IP host.

If an entire SCSI routing instance is removed, or there are no targets available for the host, the host's iSCSI driver configuration file must be updated to remove the appropriate reference before restarting the iSCSI driver. If a host's iSCSI configuration file contains a reference to an instance which does not exist or has no targets available for the host, the iSCSI driver will not complete a login and will not discover targets associated with any SCSI routing instance.

For additional information and recommended procedures for changing iSCSI driver configuration, see the iSCSI driver readme and example configuration files. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Enabling and Disabling Connections

A SCSI routing instance becomes active, by default, once it is associated with a Gigabit Ethernet interface to IP hosts. Each target that is added to an instance is also, by default, enabled. However, no IP hosts can connect or log in to that target because the target has no access list associations. Once you associate an access list with a target, it is automatically enabled; the IP hosts specified by access list entries are allowed to connect or log in to the target.

Use the **no scsirouter target enable** command to control access to the target without changing the access list associations or stopping the entire SCSI routing instance. Existing connections and logins are not affected, but future connections and logins are prohibited. Use the **scsirouter target enable** command when you are ready to allow connections and logins again.

For example, suppose you have a problem with an entry in the access list, *webserver2*. This access list is associated with the target, *webstorage2*, which is, in turn, associated with the SCSI routing instance *foo*.

Use the following procedure to temporarily disable access to the target associated with a problem access list.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show scsirouter** *foo* **stats**	Display status to confirm the SCSI routing instance, *foo*, is active on this storage router.
Step 3	**show scsirouter** *foo*	Verify the name and current status of the target and access list. The target, *webstorage2*, should be associated with the *webserver2* access list and the target should be enabled. (Example 11-6.)
Step 4	**no scsirouter** *foo* **target** *webstorage2* **enable**	Disable access to the target, *webstorage2*. (Example 11-7.)

Example 11-6 Verify Target, Access List, and Target Status

```
[SN5428-2_PR1]# show scsirouter foo
SCSI Router Information
Status Codes: A=active, I=inactive, C=create failed, D=not enabled, S=slave
                         CDB   Reserve  Pass Lun
Router               Stat Retry Proxy    Thru Reset Description
-------------------- ---- ----- -------- ---- ----- -----------
foo                  A    6     disabled no   no    test iSCSI

SCSI Router Authentication Information
Router               Authentication  Username        Password
-------------------- --------------- --------------- --------
foo                  none            none            none

Router     ServerIf   Vlan Vid IP/Netmask                       Secondary  TCP Port SLP
---------- ---------- -------- -------------------------------- ---------- -------- ---
foo        ge2                 10.1.0.45/24                     none       3260     ON

Target Attribute Information
                                    Accesslist Accesslist
Router     Target           Status   Read-Write Read-Only  Profile CRC        Description
---------- ---------------- -------- ---------- ---------- ------- ---------- -----------
foo        webstorage2      enabled  webserver2 none       High    prefer-off Web Storage
Target Attribute Information
```

Example 11-7 Verify New Target Status

```
[SN5428-2_PR1]# show scsirouter foo
SCSI Router Information
Status Codes: A=active, I=inactive, C=create failed, D=not enabled, S=slave
                         CDB   Reserve  Pass Lun
Router               Stat Retry Proxy    Thru Reset Description
-------------------- ---- ----- -------- ---- ----- -----------
foo                  A    6     disabled no   no    test iSCSI

SCSI Router Authentication Information
Router               Authentication  Username        Password
-------------------- --------------- --------------- --------
foo                  none            none            none

Router     ServerIf   Vlan Vid IP/Netmask                       Secondary  TCP Port SLP
---------- ---------- -------- -------------------------------- ---------- -------- ---
foo        ge2                 10.1.0.45/24                     none       3260     ON

Target Attribute Information
                                    Accesslist Accesslist
Router     Target           Status   Read-Write Read-Only  Profile CRC        Description
---------- ---------------- -------- ---------- ---------- ------- ---------- -----------
foo        webstorage2      disabled webserver2 none       High    prefer-off Web Storage
```

Stopping & Starting Instances

If the storage router is experiencing a problem with a specific set of IP hosts or storage resources, you may wish to stop the associated SCSI routing instance from running anywhere in the cluster. The **no scsirouter enable** command causes the specified SCSI routing instance to cease running on the SN 5428-2, but does not cause a failover to another storage router in the cluster. This command effectively stops an instance from running anywhere in the cluster.

Once a SCSI routing instance has been stopped, it can be re-activated by issuing the **scsirouter enable** command. The **scsirouter enable** command must be issued from the same storage router as the **no scsirouter enable** command.

When a SCSI routing instance is stopped, its configuration information is removed from the bootable configuration of all cluster nodes, except for the storage router from which the command was issued. See Chapter 12, "Command Line Interface Reference," for more information about the **no scsirouter enable** command.

Viewing Operational Statistics

Use the **show scsirouter stats** command to see access and connection information, such as the number of active connections and the number of logins that have occurred since the storage router was last restarted (or since statistics were last cleared).

For example, the **show scsirouter stats** command in Example 11-8 shows that SCSI routing instance, *foo*, is currently active.

Example 11-8 Results of "show scsirouter stats" Command

```
[SN5428-2_PR1]# show scsirouter foo stats
                          Logins   Logins Target Access  Authentication
Router     Started        Accepted Active Failures       Failures
---------- -------------- -------- ------ -------------- --------------
foo        Aug 01 16:01:49 10       7      0              0
```

Handling Failover

In a cluster, storage routers continually exchange information as heartbeats to detect changes or failures in the cluster. HA messages are sent using UDP over IP and, depending on the message type or situation, may be sent as unicast or multicast messages. To make sure that HA information is exchanged reliably between cluster nodes, the storage routers alternate transmission of heartbeats between the management and the HA interfaces.

Each storage router in the cluster maintains and exchanges information about available resources. Failover by eligibility is enabled by default; HA bases the decision to automatically fail over a SCSI routing instance to another storage router in a cluster based on the Fibre Channel and other resources available to that SCSI routing instance.

Failover occurs when:

- All mapped targets are unavailable or a critical resource for the SCSI routing instance is unavailable, and some or all mapped targets would be available from another storage router in the cluster. A critical resource can be a configured Gigabit Ethernet interface, a required Fibre Channel interface, or an internal resource needed to run the SCSI routing instance.

- Some mapped targets are unavailable and all mapped targets are available on another storage router in the cluster.
- All mapped targets are available, but another storage router in the cluster also has all targets available and is designated at the primary for the SCSI routing instance.
- The storage router stops receiving heartbeats from another storage router within the cluster.

Note If you need more manual control over where a SCSI routing instance runs, you can turn off failover by eligibility on a storage router. If a SCSI routing instance fails over to a storage router that is configured with failover by eligibility turned off, it will continue running on that storage router unless there are no mapped targets available or a critical resource is unavailable. Normal failover resumes when failover by eligibility is turned back on for the storage router where the SCSI routing instance is running.

The **show scsirouter all failover** command (Example 11-9) displays target and resource availability associated with each storage router in the cluster. The **show ha all** command (Example 11-10) displays the status of the failover by eligibility feature.

Each cluster supports up to 12 active SCSI routing instances. Since each storage router can also support up to 12 SCSI routing instances, high availability is ensured for each instance in the cluster (regardless of the division of those instances between storage routers).

Example 11-9 Results of "show scsirouter all failover" Command

```
[SN5428-2A]# show scsirouter all failover
    Each [   ] contains node operating characteristics for a scsirouter.
    [Instance status, Failover Priority, Eligibility]
    Instance Status('M' = Master, ' ' = Slave)
    Failover Priority('  ' = none, 'fp' = primary, 'fs' = secondary)
    Eligiblity(U = Eligibility has not been initialized
               N = None of the configured devices are available or
                   a configured interface is unavailable
               S = Some of the configured devices are available
               A = All of the configured devices are available
               P = Primary and all of the configured devices are available)

                     Configured Configured
           Configured Failover   Failover   This     Failover
Scsirouter Primary    Primary    Secondary  Node     Node List
---------- ---------- ---------- ---------- -------- ----------------
jb1        SN5428-2B   none        none     [   N]  [M  A]SN5428-2B
jb2        none        none        none     [   A]  [M  A]SN5428-2B
pad1a      none        none        none     [M  A]  [   S]SN5428-2B
pad1b      SN5428-2A   none        none     [M  A]  [   S]SN5428-2B
pad2a      SN5428-2B   none        none     [   S]  [M  A]SN5428-2B
pad2d      SN5428-2B   none        none     [   S]  [M  A]SN5428-2B
pad3a      SN5428-2A   none        none     [M  A]  [   N]SN5428-2B
```

Example 11-10 Results of "show ha all" Command

```
[SN5428-2A]# show ha all
System Name       Configuration  Status  MGMT  HA    Failover By Eligibility
SN5428-2A         CLUSTERED      up      up    up    on
```

Manual Failover

While failover of SCSI routing instances is automatic, there may be times when you wish to manually move a SCSI routing instance from one storage router to another. The move may be temporary, after which the instance will be moved back to its original location. At other times, you may want to move a SCSI routing instance permanently to another storage router, ensuring that the instance will continue running on the specified node whenever possible. The *primary* attribute allows you to specify a "preferred" storage router for the specified SCSI routing instance.

As an example cluster scenario, a cluster is composed of two storage routers, *Sys1* and *Sys2*. *Sys1* is currently running instances, *scsi1* and *scsi2*, and is the primary storage router for both instances. *Sys2* is currently running instances, *scsi3* and *scsi4*. The primary attribute for *scsi3* and *scsi4* is set to the default setting of **none**, indicating no preferred storage router for failover for either instance. Both storage routers have the same resources available for the configured SCSI routing instances and both storage routers have failover by eligibility enabled (the default configuration).

Failover as Temporary Move

Referring to the example cluster scenario just described, the following procedure moves the SCSI routing instances, *scsi1* and *scsi2*, from their primary, or preferred, storage router, *Sys1*, to the other storage router on a temporary basis. The first two commands in this procedure are issued from a CLI session from *Sys2*; the remaining commands are issued from *Sys1*.

	Command	Description
Step 1	**enable**	Enter Administrator mode on *Sys2*.
Step 2	**no failover eligibility on**	Disable failover by eligibility for *Sys2*. **Note** This will prevent the SCSI routing instances from automatically failing back over to *Sys1* due to their primary attribute setting.
Step 3	**enable**	Enter Administrator mode on *Sys1*.
Step 4	**failover scsirouter all**	Failover all SCSI routing instances running on *Sys1*. **Note** Because there are only two storage routers in the cluster, you do not need to specify the failover destination.
Step 5	**show cluster** or **show scsirouter all brief**	Verify that the SCSI routing instances are no longer running on the storage router, *Sys1*.

Once the failover is complete, return to your management session with *Sys2* and verify—using CLI commands described in Step 5 above—that the SCSI routing instances, *scsi1* and *scsi2*, are now running on that storage router.

This is considered a temporary move because *Sys1* is still designated as the primary storage router for the SCSI routing instances. If, for example, failover eligibility is manually re-enabled on *Sys2* or if *Sys2* is rebooted, *scsi1 and scsi2* will stop running on *Sys2* and will start up and run on *Sys1*.

Note Use caution if you change the configuration of a SCSI routing instance while it is running on the storage router that is not the instance's configured primary. If the instance's configuration changes while the designated primary for that instance is down (or otherwise removed from the cluster), the changes will not be propagated to that node. When the primary reboots (or otherwise returns to the cluster), it will reassert itself as the primary and will start to run the instance using the last configuration it had before leaving the cluster.

Failover as Permanent Move

Referring to the example cluster scenario previously described, the following procedure moves the SCSI routing instance, *scsi2*, from its primary, or preferred, storage router, *Sys1*, to the other storage router on a permanent basis. The commands in this procedure are issued from a CLI session from *Sys1*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show cluster** or **show scsirouter** *scsi2* **brief**	Verify that the instance to be moved, *scsi2*, is indeed running on *Sys1*.
Step 3	**scsirouter** *scsi2* **primary** *Sys2*	Set *Sys2* as the primary for the desired SCSI routing instance, *scsi2*.
Step 4	**save scsirouter** *scsi2* **bootconfig**	Save the current SCSI routing instance configuration, including the primary setting, and circulate the changed configuration around the cluster.
Step 5	**failover scsirouter** *scsi2*	(Optional) Manually failover the desired SCSI routing instance, *scsi2*. **Note** Because the storage routers are both enabled for failover by eligibility and have access to the same resources for the SCSI routing instances, *scsi2* will automatically failover to *Sys2* because it is now configured as the primary for that instance.

Once the failover is complete, establish a management session to *Sys2* and verify—using the **show scsirouter scsi2** command—that the SCSI routing instance, *scsi2*, is now running on *Sys2* and that *Sys2* is designated as the primary for that instance.

Failover for Distribution Purposes

In the example cluster scenario previously described, there is a significant increase in traffic for SCSI routing instance, *scsi4*, and as a result, you decide to distribute all of the other instances (*scsi1*, *scsi2*, and *scsi3*) to *Sys1*. *Sys1* is already running *scsi1* and *scsi2*.

The following procedure moves the SCSI routing instance, *scsi3*, to *Sys1*. The commands in this procedure are issued from a CLI session from *Sys2*.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show cluster** or **show scsirouter** *scsi3* **brief**	Verify that the SCSI routing instance to be moved is indeed running on *Sys2*.
Step 3	**failover scsirouter** *scsi3* **to** *Sys1*	Failover the desired SCSI routing instance, *scsi3*, to *Sys1*.

Once the failover is complete, establish a management session to *Sys1* and verify—using the **show scsirouter** command—that instances, *scsi1*, *scsi2*, and *scsi3*, are now running there.

Note Because *scsi3* has no primary setting, it will remain running on *Sys1* until it is explicitly stopped or failed over, or until it is automatically failed over by HA because of an interface failure or an unfavorable target resource comparison.

Managing CDP on the SN 5428-2 Storage Router

Cisco Discovery Protocol (CDP) is primarily used to obtain protocol addresses of neighboring devices and to discover the platform of those devices. CDP is media- and protocol-independent and runs on all Cisco-manufactured equipment including routers, bridges, access servers, and switches.

Each device configured for CDP sends periodic messages, known as advertisements, to a multicast address. Each device advertises at least one address at which it can receive SNMP messages. The advertisements contain time-to-live, or holdtime, information, which indicates the length of time a receiving device should hold CDP information before discarding it. Each device also listens to the periodic CDP messages sent by others in order to learn about neighboring devices and determine when their interfaces to the media go up or down.

The storage router is enabled, by default, to exchange CDP information with other CDP-enabled devices in the network. CDP can be enabled or disabled for individual interfaces on the storage router, and the holdtime for receiving devices and the frequency of CDP transmissions from the storage router can be modified.

Disable CDP for Selected Interfaces

CDP can be enabled or disabled for the storage router management, HA, and Gigabit Ethernet interfaces. By default, all interfaces are enabled for CDP. Use the following procedure to disable CDP for an interface.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**no cdp interface** *ge2* **enable**	Disable CDP on the desired interface (*ge2*).
Step 3	**show cdp interface**	Confirm that CDP is disabled for the interface.
Step 4	**save system bootconfig**	(Optional) Save the CDP change to the storage router bootable configuration.

Modify the CDP Holdtime and Timeout Values

Holdtime is the amount of time the receiving device should hold a CDP packet from the storage router before discarding it. The CDP holdtime value must be set to a higher number of seconds than the CDP timer value (the time between CDP transmissions from the storage router). For example, the default CDP holdtime value is 180 seconds. The default CDP timer value is 60 seconds.

Use the following procedure to change the CDP holdtime value and the CDP timer value.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show cdp**	Verify the current CDP configuration.
Step 3	**cdp holdtime** *300*	Set the number of seconds (*300*) that a receiving device should hold the storage router CDP packet.
Step 4	**cdp timer** *120*	Set the number of seconds (*120*) between transmissions of CDP packets from the storage router.
Step 5	**show cdp**	(Optional) Verify the new CDP configuration.
Step 6	**save system bootconfig**	(Optional) Save the CDP changes to the storage router bootable configuration.

Using Scripts to Automate Tasks

If you frequently issue a series of CLI commands, you can save time by entering those commands into a script for execution purposes. Command scripts are stored in the *script* directory and are simply ASCII text files containing CLI commands.

When scripts run, the commands and any responses are echoed on the storage router console.

Scripts can be created on any system using any text editor and placed in the *script* directory (*/ata3/script*) of the target SN 5428-2 using the **copy** command to copy the script file to the storage router using HTTP or TFTP. You can also use FTP to make the file available to the storage router. See "Using FTP with the SN 5428-2 Storage Router" for more information about using FTP to transfer files.

Follow these rules when creating a command script:

- Commands can start anywhere on a line. The first word on any line that is not preceded by a comment character is considered to be the start of a command string.
- Comments can be added by placing an exclamation point (!) or number sign (#) character at the beginning of the line or as the first character at any position in the line. Comments are useful for documenting the contents of the file and the expected results. Comments can also be used to prevent a command from executing without removing it from the file by inserting a comment character before the command string.
- You can extend commands across line boundaries by ending a line with a backslash (\ ) as the continuation character. Use the continuation character to make long commands more readable. The line sequence is continued until a command line without a continuation character is encountered. If a comment line is used to end a line continuation sequence, you must add a blank line after the comment.

For example:

```
radius-server host 10.5.0.53 \
    auth-port 1644 \
    timeout 60 \
    retransmit 5
! Configure 1st RADIUS server

radius-server host 10.6.0.61
. . .
```

- Scripts can be invoked from other scripts.
- You can pass parameters to scripts. Within the script, the key character is the "@" which instructs the script execution function to substitute the value of the specified parameter. Whenever the execution function encounters @1, it substitutes the value of the first passed parameter. The value of the second parameter is substituted for @2, and so forth. You must use the **force** keyword to pass parameters to the script.

Running Command Scripts

Use the following procedure to execute the CLI commands stored in a script file. In this example, the script file is named *CreateSc* and must exist in the *script* directory.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show script** *CreateSc*	Verify that the script, *CreateSc*, exists in the *script* directory and that it contains the configuration that you want to recreate.
Step 3	**read script** *CreateSc* or **read script** *CreateSc* **force**	Read and execute the CLI commands in the script file. When prompted, confirm that you want to continue and execute the script commands. (Optional) Use the **force** keyword to execute the script immediately without asking for confirmation. The **force** keyword is also required if you are passing parameters to the script.

After the script completes, issue the appropriate **show** commands to verify that the script executed as expected.

Using the SN 5428-2 Logging Facilities

The SN 5428-2 Storage Router generates a variety of system event messages. All storage router event and debug messages are issued in the following format:

Example 11-11 Event Message

```
Mar 18 11:48:05: %SNMP-5-SASAS: SnmpApp starting...
<timestamp>: %<facility>-<level_number>-<mnemonic>: <message text>
```

All messages are assigned a notification level, which reflects the priority of the message in the system. Messages with the highest priority are assigned a notification level of emergency. Messages at this level indicate that the system is unusable. Messages with the lowest priority are assigned a notification level of debug. Messages at this level are for troubleshooting purposes. In Example 11-11, the message level number is 5, indicating a notification level of notice.

Table 11-1 lists the notification levels, their level number, and their description.

Table 11-1 Event Message Notification Levels

Notification Level	Level Number	Description
emergency	0	System unusable
alert	1	Immediate action needed
critical	2	Critical conditions
error	3	Error conditions
warning	4	Non-fatal warning conditions
notice	5	Normal but significant conditions
info	6	Informational messages only
debug	7	Information for troubleshooting purposes

Event, trace and debug messages can be routed to various destinations, based on the notification level of the message and the application area (facility) that generated the message. Table 11-2 lists the logging destinations and their descriptions; Table 11-3 lists the logging facilities and their descriptions.

Table 11-2 Event Message Logging Destinations

Destination	Description
all	Logs the message to all destinations.
none	The message is not logged; it is discarded.
console	The message is logged to a serial console CLI session.
logfile	The message is logged to the storage router logfile.
rslog	The message is logged to a remote syslog server. Use the **logging syslog** command to specify the IP address of the remote syslog server.
vty	The message is logged to all Telnet, SSH, or other virtual terminal CLI sessions.

Table 11-3 Event Message Facilities

Facility	Description
ALL	All facilities.
AUTH	AAA authentication.
CDP	Cisco Discovery Protocol.
CONF	Configuration functions.
FC	Fibre Channel interfaces.
FCIP	FCIP functions.

Table 11-3 Event Message Facilities (continued)

Facility	Description
GE	Gigabit Ethernet interfaces.
HA	High availability cluster functions.
IF	Interface manager.
INVALID	Generic functions.
IP	IP functions.
ISCSI	iSCSI functions.
MON	Hardware monitor.
SLP	Service Location Protocol service functions.
SNMP	Simple Network Management Protocol.
SYSLOG	Syslog functions.
UI	User interface functions.
VTP	VTP and VLAN functions.

Messages are routed by creating a list of routing rules that is searched for a facility and notification level match whenever an event or debug message is received. This list of routing rules is known as the storage router *logging table*.

By default, the logging table includes rules to log all messages at notification level notice (or numerically lower levels) to all destinations, and to log all messages at notification level info to the storage router log file. Any message that does not find a matching rule is not logged to any destination.

Use the **show logging** command to display the current logging table routing rules and other logging information.

Filtering and Routing Event Messages

The logging table allows messages to be filtered by their facility and notification level and routed to the specified destination(s). When an event message arrives, the logging table rules are searched by facility name and by level until the first match is found. The message is sent to all the destinations specified by the matching rule. If no match is found, the event message is discarded.

When a new routing rule is added, it is appended to the existing table. Use the **logging level** command to add a new routing rule to the logging table; use the **logging #?** command to insert a routing rule into the logging table before the specified entry.

Each facility can have eight notification levels. Each facility and notification level pair can have up to seven destinations.

In Example 11-11, the facility is SNMP, and the notification level is 5 (notice). If the logging table included the entries in Example 11-12, the event message in Example 11-11 would match on the first routing rule, and would be sent to all valid destinations. Any message from the SNMP facility at notification level info, and any message from another facility at notification level info (or lower) would match on the second rule and be sent to the storage router console and log file. All messages from any facility at notification level debug would be discarded.

Example 11-12 Example Log Route Entries List

```
Index Level     Priority Facility   Route
1     notice    5        SNMP       all
2     info      6        all        console logfile

Syslog host is enabled, ipaddress is 10.1.70.6
```

The logging table can be saved and retained across a storage router restart. The order of the rules in the logging table is preserved when entries are deleted.

Enabling and Disabling Logging

Logging is enabled by default. By default, the SN 5428-2 Storage Router includes the following routing rules in the logging table:

- All messages at notification level notice or lower are logged to all valid destinations.
- All messages at notification level info are logged to the storage router log file.
- All debug messages are discarded.

Use the **no logging on** command to quickly disable logging for all destinations without modifying the logging table. No logging will take place until logging is re-enabled by the **logging on** command.

If you clear the logging table without returning to the factory defaults, all rules are removed from the logging table. This causes all messages to be discarded because there are no matching rules in the logging table. To resume logging, you can add new routing rules, restore a previously saved logging table, or clear the logging table back to the factory defaults.

Managing the Log File

You can view the entire storage router log file or selected portions of the log file using the **show logging** command. You can also view the log file using the web-based GUI. If you want to analyze or search the log file in more detail, you can use FTP to retrieve a copy of the log file. See "Using FTP with the SN 5428-2 Storage Router" for more information about using FTP to transfer files.

Log files are created in the SN 5428-2 *log* directory (*/ata4/log*). They can occupy up to 4 MB of memory. Once this limit has been reached, the oldest file is removed and a new one is created. The **show logging size** command can be used to display the size of the existing log files. The **show system** command can be used to display the amount of space allocated to log files, and the amount of log file space currently available.

The name of the log file is *messages*, followed by a number (for example, *messages3* or *messages12*). The first log file is named *messages0*, the next log file is named *messages1*, etc.

Depending on the needs of your enterprise, you can archive log files to a remote server, or you can clear log files on a periodic basis. You can use FTP to transfer files from the storage router to a remote server, or you can use the web-based GUI to display the contents of the log file and use cut-and-paste techniques to save the information to a local file. You can also issue the **show logging all** command and redirect the output of your console using the logging facilities for your specific console interface.

Clearing the Log Files

Use the following procedure to periodically clear the log files.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show logging size**	(Optional) Check the current size of the log files (Example 11-13).
Step 3	**show logging all** or **show logging last** *50*	(Optional) Display all the current log file entries (first command), or display a selected number of entries, such as 50, from the end of the file (second command).
Step 4	**clear log**	Clear the existing log file. The system clears the existing log file and starts a new log file.

Example 11-13 Results of "show logging size" Command

```
[SN5428-2_PRA]# show logging size
5120 messages (342797 bytes) logged
```

Gathering Troubleshooting Information

If you experience problems with the storage router, you may need to obtain troubleshooting information for Cisco technical support personnel. The SN 5428-2 Storage Router provides several features that can help you assemble the necessary information.

The following are typical activities involved with troubleshooting the SN 5428-2:

- Using the Crash Log, page 11-33
- Using FTP with the SN 5428-2 Storage Router, page 11-35
- Understanding Diagnostics, page 11-36
- Capturing System Messages at Bootup, page 11-36
- Capturing the Storage Router Configuration, page 11-37
- Using Debug Facilities, page 11-37

Using the Crash Log

If the storage router experiences an unexpected problem that forces it to automatically reboot, a special log file is generated. The file is named *crash-cpp.txt* and it is stored in the *log* directory (*/ata4/log*). You can display the contents of this file to the console using the **show crash** command.

To save the **show crash** command output, redirect the output of your console using the logging facilities for your specific console interface. Depending on your console interface and scroll buffer size, you may also be able to copy and paste the contents from your console into an ASCII text file.

The crash log provides the following information:

- System information, including software version
- Exception information
- Boot information, including the kernel version and creation date
- A list of all tasks, including entry point, task ID and priority for each task
- Task registers and stack trace for each task in the task list
- Net job ring
- A list of all modules, including module ID, data start addresses, etc.
- A list of all devices
- A list of all drivers, including the number of create, delete, open, close, read, write, and I/O control actions performed
- A list of free memory addresses and a summary of memory usage information
- A list of open file descriptors
- Network interface information, including flags, interface type, addresses, and MTU information for all storage router interfaces
- The route table
- The ARP table
- The host table
- Active Internet connection information, including PCB, connection type (TCP or UDP), receive and send queues, local and foreign addresses, and state for each connection
- Routing statistics
- IP statistics
- ICMP statistics
- TCP statistics
- UDP statistics
- Network stack data pool (MBufs) and cluster pool table information
- NFS authorization
- Mounted NFS filesystem information
- Boot filesystem information
- Registered crash dump functions
- CPC710 registers at time of exception

Information used to create the *crash-cpp.txt* file is periodically written to the *tmpcrash.txt* file in the *log* directory. If a crash occurred at the current time, use the **show crash current** command to display the information as it would be written to the crash log.

Using FTP with the SN 5428-2 Storage Router

In certain cases, you may want to copy log files from the storage router to another server in your network for analysis purposes, or you may want to copy configuration or script files to another server prior to making them available to another SN 5428-2. The storage router includes an FTP daemon; however, the FTP port (port 21) is, by default, restricted.

Use the following procedure to enable FTP and to copy the current message log file from the storage router to another server in the network.

	Command	Description
Step 1	**enable**	Enter Administrator mode.
Step 2	**show restrict**	Display interface restrictions. If port 21 on the management interface (mgmt) is closed, use the command in Step 3 to open it.
Step 3	**no restrict mgmt ftp**	(Optional) Allow FTP functions on the management interface.

Once the function is enabled, open the FTP session to the storage router from the server. You will be prompted for a user name and password. The user name is *admin* and the password is the storage router Administrator password (or, if you are using Enable authentication, the password that you would enter in response to the CLI **enable** command). The default Administrator password is *cisco*.

Note The user name and the password are both case sensitive.

The log files and crash trace files are stored in the */ata4/log* directory. Saved configuration files are stored in the */ata3/savedconfig* directory. Script files are stored in the */ata3/script* directory.

To use FTP to retrieve the log file, change to the */ata4/log* directory using the FTP *cd* command. List the files to determine what log file you want to retrieve. (In our example, the log file is *messages0*.) If necessary, specify the binary flag using the FTP *binary* command. Issue the FTP *get* command to retrieve the log file and to copy it to the specified file on your server. When the process completes, close the FTP connection using the FTP *bye* command.

Example 11-14 illustrates the FTP session just described. In this example, the storage router management interface IP address is 10.1.11.210.

Example 11-14 FTP Session

```
Server1> ftp 10.1.11.210
Connected to 10.1.11.210.
220 VxWorks (5.4.1) FTP server ready
Name: admin
331 Password required
Password:********
230 User logged in
ftp> cd /ata4/log
250 Changed directory to "/ata4/log"
ftp> dir
200 Port set okay
150 Opening ASCII mode data connection
  size         date      time      name
--------       ------    ------    --------
     512    Apr-09-2002  20:46:18   .                <DIR>
     512    Apr-09-2002  20:46:18   ..               <DIR>
   13803    May-16-2002  15:13:56   messages0
```

```
   92167    Apr-10-2002  19:14:06   tmpcrash.txt

226 Transfer complete
ftp: 374 bytes received in 0.02Seconds 23.38Kbytes/sec.
ftp> binary
200 Type set to I, binary mode
ftp> get
(remote-file) messages0
(local-file) SN5428-2Sys1_Messages
200 Port set okay
150 Opening BINARY mode data connection
226 Transfer complete
40863 bytes received in 0.049 seconds (8.1e+02 Kbytes/s)
ftp> bye
221 Bye...see you later
```

If you had to remove the restriction on the management interface before proceeding with the FTP session, return to the CLI session and re-enable the restriction, using the following procedure.

	Command	Description
Step 1	**show restrict**	Verify that port 21 on the management interface is currently open.
Step 2	**restrict mgmt ftp**	Close the management interface to FTP functions. No FTP functions will be allowed.

Understanding Diagnostics

The SN 5428-2 Storage Router normally performs hardware diagnostics when the unit is powered up. A message displays during the power up process, indicating that hardware diagnostics can be skipped if the Escape key is pressed within five seconds. If the Escape key is pressed, all hardware diagnostics are bypassed for this reboot only. If no key is pressed, diagnostics will begin after the five second wait period expired.

If a hardware diagnostic fails, the storage router halts. The boot process cannot be reinitiated. If you experience a hardware diagnostic failure, contact Cisco technical support personnel as described in the "Obtaining Technical Assistance" section on page xiii for further instructions.

The SN 5428-2 performs additional "soft" diagnostics after the hardware diagnostics complete on power up and after every system reboot. If necessary, the soft diagnostics can be bypassed, using the **reboot** command with the **fast** keyword.

If you experience problems with soft diagnostics, contact Cisco technical support personnel for assistance.

Capturing System Messages at Bootup

The SN 5428-2 Storage Router logs a variety of messages to the console during the system boot process. If you are experiencing problems with the storage router, it may be helpful to capture these messages. Use the console interface to perform the boot process and capture the console log using typical external methods.

Capturing the Storage Router Configuration

You can use the **show runningconfig** or **show bootconfig** command to display the storage router current running configuration or the bootable configuration. You can then redirect this display to create a script file in the SN 5428-2 *script* directory. The resulting file can be used as a basis to create command scripts to automate common tasks. See "Using Scripts to Automate Tasks" for more information about using scripts on the storage router.

Using Debug Facilities

The storage router includes debug facilities for SCSI routing instances, RIP, and packet tracing for Gigabit Ethernet interfaces. Running debug traces can impact the operation of the storage router. If you experience problems with a SCSI routing instance that cannot be resolved, Cisco technical support personnel may ask you to capture some debug traces. They will assist you to properly configure the storage router to accomplish this task.

See Chapter 12, "Command Line Interface Reference," for more information about the **debug** commands and using the storage router debug facilities.

CHAPTER 12

Command Line Interface Reference

The Cisco SN 5428-2 Storage Router provides three interfaces for operation, configuration, administration, maintenance, and support tasks: command line interface (CLI), web-based GUI, and SNMP.

This chapter documents the storage router CLI. For help on the web-based GUI, point your browser to the storage router's management interface IP address. After logging on, click the Help link to access the online help system.

This chapter provides information about the following CLI topics:

- About CLI Commands, page 12-1
- CLI Usage Tips, page 12-1
- CLI Commands, page 12-2

About CLI Commands

This chapter lists all possible CLI commands. However, the set of CLI commands and keywords that are available to you depends on the level of authority associated with your CLI management session and the deployment option selected for the SN 5428-2 Storage Router during initial configuration.

Use the **show cli** command to view all CLI commands and keywords that are valid for your current CLI management session.

CLI Usage Tips

- Commands and keywords can be truncated at any point after they are unique.
- Use the Tab key to complete the current word.
- Use the question mark (?) key to list all of the options available at that point in the command line.
- CLI commands and keywords are not case-sensitive. Commands and keywords can be entered in any case (including mixed case).
- User-defined strings are case-sensitive. User-defined strings must be entered in the appropriate case (including mixed case). Case for user-defined strings is preserved in the configuration.
- An asterisk (*) at the beginning of the CLI command prompt indicates that the system configuration has been changed but not saved.

CLI Commands

This section lists all CLI commands in alphabetical order. The **no** form of any command is shown with the primary command entry. Command information includes syntax, defaults, mode, history, usage guidelines, examples, and related commands.

aaa authentication enable

To configure authentication, authorization and accounting (AAA) authentication services for Administrator mode access to the CLI (via the CLI **enable** command), use the **aaa authentication enable** command. To disable this authentication, use the **no** form of this command.

aaa authentication enable default *services1 [services2...]*

no aaa authentication enable default

Syntax Description

default	The name of the authentication list. The list name must be *default*.
services1 [services2...]	At least one of the services described in Table 12-1.

Defaults

If the default list is not configured, only the Administrator mode password is checked. This has the same effect as the following command:

```
aaa authentication enable default enable
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Administrator mode access ("Enable") authentication uses AAA authentication services to provide authentication of users that request Administrator mode access to the storage router via the CLI **enable** command. Because the **enable** command does not require you to enter a user name, the special user name *$enab15$* is used if RADIUS or TACACS+ servers are used for authentication.

AAA attempts to use each service in the order listed in the default authentication list, until authentication succeeds or fails. If the service fails to find a user name and password match, authentication fails and access is denied. If AAA returns an error (because the RADIUS or TACACS+ server is not available, for example), AAA attempts to use the next service in the list for authentication. To specify that the authentication should succeed even if all methods return an error (not if they return an authentication failure), specify **none** as the final method in the command line. Use the **show aaa** command to display the current authentication lists.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa authentication enable** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Note Enable authentication extends to users accessing the storage router via an FTP session. An FTP session requires the user name *admin* and the password that would be entered for the CLI **enable** command.

In Table 12-1, the **group radius** and **group tacacs+** methods refer to all previously defined RADIUS or TACACS+ servers; the **group** *name* method refers to a previously defined group of one or more RADIUS or TACACS+ servers. Use the **radius-server host** and **tacacs-server host** commands to configure the servers, and the **aaa group server radius** and **aaa group server tacacs+** commands to create server groups.

Table 12-1 aaa authentication enable default services

Keyword	Description
enable	Uses the configured Administrator mode password for authentication.
group *name*	Uses a named group of defined RADIUS or TACACS+ servers for authentication, using the user name *$enab15$*.
group radius	Uses the list of all RADIUS servers for authentication, using the user name *$enab15$*.
group tacacs+	Uses the list of all TACACS+ servers for authentication, using the user name *$enab15$*.
monitor	Uses the configured Monitor mode password for authentication.
none	Uses no authentication.

Examples

The following example creates a default AAA authentication list to be used to perform Enable authentication. When Administrator access of the storage router is requested via the CLI **enable** command, AAA first attempts to contact a RADIUS server, using the *$enab15$* username and the entered password. If no server is found, AAA returns an error and authentication is performed by checking the entered password against the configured Administrator mode password. If there is no match, authentication fails and you are denied Administrator access.

```
[SN5428-2A]# aaa authentication enable default group radius enable
```

Related Commands

Command	Description
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

aaa authentication iscsi

To configure authentication, authorization and accounting (AAA) authentication services for iSCSI authentication of IP hosts requesting access to storage via SCSI routing instances, use the **aaa authentication iscsi** command. To disable this authentication, use the **no** form of this command.

aaa authentication iscsi {*listname* **| default}** *services1 [services2...]*

no aaa authentication iscsi {*listname* **| default}**

Syntax Description

listname	The name of the authentication list. Enter a maximum of 31 characters.
default	The name of the default authentication list.
services1 [services2...]	At least one of the services described in Table 12-2.

Defaults

If iSCSI authentication is enabled and the named authentication list is not configured, authentication fails.

If iSCSI authentication is enabled using the default list but the default list is not configured, only the local user database is selected. This has the same effect as the following command:

```
aaa authentication iscsi default local
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

iSCSI authentication uses AAA authentication services to provide authentication of IP hosts that request access to storage from SCSI routing instances that have authentication enabled.

AAA attempts to use each service in the order listed in the specified iSCSI authentication list, until authentication succeeds or fails. If the service fails to find a user name match, authentication fails. If AAA returns an error (because the RADIUS or TACACS+ server is not available, for example), AAA attempts to use the next service in the list for authentication.

If either local or local-case is the first service on the iSCSI authentication list and AAA fails to find a user name match, AAA attempts to use the next method on the list for authentication. If the local or local-case service is in any other position on the list and AAA fails to find a user name match, authentication fails and access is denied. If a RADIUS or TACACS+ server fails to find a user name match (regardless of position on the iSCSI authentication list), authentication fails and access is denied.

Use the **show aaa** command to display the current authentication lists.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa authentication iscsi** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

In Table 12-2, the **group radius** and **group tacacs+** methods refer to all previously defined RADIUS or TACACS+ servers; the **group** *name* method refers to a group of one or more RADIUS or TACACS+ servers. Use the **radius-server host** and **tacacs-server host** commands to configure the servers, and the **aaa group server radius** and **aaa group server tacacs+** commands to create server groups.

Note A named server group must be defined to be used as an authentication method. However, verification of server groups occurs only at runtime. If a server group is not defined, the authentication process generates error messages and the server group is skipped. This could cause unexpected authentication failures.

Table 12-2 aaa authentication iscsi services

Keyword	Description
group *name*	Uses a named group of defined RADIUS or TACACS+ servers for authentication.
group radius	Uses the list of all RADIUS servers for authentication.
group tacacs+	Uses the list of all TACACS+ servers for authentication.
local	Uses the local username database for authentication.
local-case	Uses case-sensitive local username authentication.
none	Uses no authentication.

If the local authentication service is selected, the user name validation is not case-sensitive. If local-case authentication service is selected, the user name validation is case-sensitive. The password validation for both the local service and the local-case service is case-sensitive.

Examples

The following example creates a new AAA authentication list named *webtest* and enables iSCSI authentication for the SCSI routing instance named *myCompanyWebserver2*, using the *webtest* authentication list. When iSCSI authentication is required, AAA first tries to use the local username database for authentication. If no match is found, AAA attempts to contact a TACACS+ server. If no server is found, AAA returns an error and the IP host is allowed access with no authentication.

```
[SN5428-2A]# aaa authentication iscsi webtest local group tacacs+ none
[SN5428-2A]# scsirouter myCompanyWebserver2 authentication webtest
```

Related Commands

Command	Description
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

aaa authentication login

To configure authentication, authorization and accounting (AAA) authentication services for Monitor mode access to the storage router via the CLI, use the **aaa authentication login** command. To disable this authentication, use the **no** form of this command.

aaa authentication login default *services1 [services2...]*

no aaa authentication login default

Syntax Description

default	The name of the authentication list. The list name must be *default*.
services1 [services2...]	At least one of the services described in Table 12-3.

Defaults

If the default list is not configured, only the Monitor mode password is checked. This has the same effect as the following command:

```
aaa authentication login default monitor
```

Note If the default list is not configured, you are only prompted to enter a password; you are not prompted to enter a user name.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Monitor mode access ("Login") authentication uses AAA authentication services to provide authentication of users that request Monitor mode access to the SN 5428-2 Storage Router via the CLI. A user attempting Monitor mode access of the storage router via the CLI will be prompted for a user name and password.

AAA attempts to use each service in the order listed in the default authentication list, until authentication succeeds or fails. If the service fails to find a user name match, authentication fails. If AAA returns an error (because the RADIUS or TACACS+ server is not available, for example), AAA attempts to use the next service in the list for authentication. To specify that the authentication should succeed even if all methods return an error (not if they return an authentication failure), specify **none** as the final method in the command line.

If either local or local-case is the first service on the default authentication list and AAA fails to find a user name match, AAA attempts to use the next method on the list for authentication. If the local or local-case service is in any other position on the list and AAA fails to find a user name match, authentication fails and access is denied. If a RADIUS or TACACS+ server fails to find a user name match (regardless of position on the default authentication list), authentication fails and access is denied.

If the Enable service is used, the user name is ignored and the password is authenticated against the configured Administrator mode password. If the Monitor service is used, the user name is ignored and the password is authenticated against the configured Monitor mode password.

Note AAA does not provide authentication for access via the GUI (using HTTP or HTTPS).

Use the **show aaa** command to display the current authentication lists.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa authentication login** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

In Table 12-3, the **group radius** and **group tacacs+** methods refer to all previously defined RADIUS or TACACS+ servers; the **group** *name* method refers to a previously defined group of one or more RADIUS or TACACS+ servers. Use the **radius-server host** and **tacacs-server host** commands to configure the servers, and the **aaa group server radius** and **aaa group server tacacs+** commands to create server groups.

Table 12-3 aaa authentication login default services

Keyword	Description
enable	Uses the configured Administrator mode password for authentication. The user name is ignored.
group *name*	Uses a named group of defined RADIUS or TACACS+ servers for authentication.
group radius	Uses the list of all RADIUS servers for authentication.
group tacacs+	Uses the list of all TACACS+ servers for authentication.
local	Uses the local username database for authentication.
local-case	Uses case-sensitive local username authentication.
monitor	Uses the configured Monitor mode password for authentication. The user name is ignored.
none	Uses no authentication.

If the local authentication service is selected, the user name validation is not case-sensitive. If local-case authentication service is selected, the user name validation is case-sensitive. The password validation for both the local service and the local-case service is case-sensitive.

Examples

The following example creates a default AAA authentication list to be used to perform Login authentication. AAA first attempts to contact a RADIUS server. If no server is found, AAA returns an error and authentication is performed by checking the local username database. If no match is found, AAA performs authentication by checking the entered password against the configured Monitor mode password.

```
[SN5428-2A]# aaa authentication login default group radius local monitor
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of RADIUS servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

aaa generate password

To generate a long random password, use the **aaa generate password** command.

aaa generate password

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to generate a long random password. From a CLI management session, you can cut and paste this password into other commands or applications, using the conventions appropriate to your specific Telnet or SSH client, or operating system.

Examples

The following example generates a long random password:

```
[SN5428-2A]# aaa generate password
Password: 28b79da19608342a99642ce92fbdd3114
```

Related Commands

Command	Description
aaa test authentication	Enable testing of the specified AAA authentication list.
admin password	Set the login password for administrative access to the storage router management interface.
monitor password	Set the login password for view-only access to the storage router management interface.
username password	Add a user name and optional password to the local username database.

aaa group server radius

To create a named group of RADIUS servers to be used for AAA authentication, use the **aaa group server radius** command. To disable an existing group of RADIUS servers, use the **no** form of this command.

aaa group server radius *name*

no aaa group server radius *name*

Syntax Description

name	The name of the group of RADIUS servers to be used for AAA authentication. Enter a maximum of 31 characters.

Defaults

None. All configured RADIUS servers belong to the group named *radius*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to create a subset of RADIUS servers to be used for AAA authentication. The named group can then be added to a AAA authentication methods list, allowing the specified set of RADIUS servers to be used for authentication. After creating the named group, use the **aaa group server radius server** command to add a RADIUS server to the group.

Use the **radius-server host** command to configure a RADIUS server to be used by the storage router for AAA authentication.

Group names must be unique across the storage router; you cannot have a group of RADIUS servers named *labauth* and a group of TACACS+ servers named *labauth*. The default group name of *radius* includes all configured RADIUS servers.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa group server radius** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example creates a RADIUS server group named *region2*:

```
[SN5428-2A]# aaa group server radius region2
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
aaa group server radius server	Add the specified RADIUS server to the named RADIUS server group.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa test authentication	Enable testing of the specified AAA authentication list.
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
radius-server key	Sets the global authentication and encryption key for all RADIUS communications between the storage router and the RADIUS daemon.
radius-server retransmit	Specifies how many times the storage router resends the RADIUS request to a server before giving up.
radius-server timeout	Sets the interval the storage router waits for a RADIUS server to reply before retransmitting.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.

aaa group server radius deadtime

To improve RADIUS response time when some servers might be unavailable, use the **aaa group server radius deadtime** command to cause the storage router to skip the unavailable servers in the specified group immediately. To set the dead time to 0, effectively preventing the storage router from skipping any RADIUS server in the specified group, use the **no** form of this command.

aaa group server radius *name* **deadtime** *minutes*

no aaa group server radius *name* **deadtime**

Syntax Description

name	The name of the group of RADIUS servers. Enter a maximum of 31 characters.
minutes	The length of time, in minutes, for which a RADIUS server in the specified group is skipped over by the storage router when requesting AAA authentication services, up to a maximum of 1440 minutes (24 hours).

Defaults

The dead time is set to zero (0) by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to cause the storage router to mark as "dead" any RADIUS servers in the specified group that fail to respond to authentication requests, thus avoiding the wait for the authentication request to time out before trying the next configured server. A RADIUS server marked as dead is skipped by additional requests for the specified number of minutes, unless all RADIUS servers in the specified list are marked as dead. If all RADIUS servers in a group are marked as dead, the deadtime setting is ignored.

This command overrides the global setting that applies to all configured RADIUS servers. If the deadtime is not set for a RADIUS server group, the global dead time setting applies.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa group server radius deadtime** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example specifies a dead time of five minutes for all RADIUS servers in the group named *region2* that fail to respond to AAA authentication requests:

```
[SN5428-2A]# aaa group server radius region6 deadtime 5
```

The following example effectively sets a dead time of zero minutes for all RADIUS servers in the group named *region6*. The global dead time value, if set, will apply to all RADIUS server in the group.

```
[SN5428-2A]# no aaa group server radius region6 deadtime
```

Related Commands

Command	Description
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
show aaa	Display AAA configuration information.

aaa group server radius server

To add a RADIUS server to a named group of RADIUS servers to be used for AAA authentication, use the **aaa group server radius server** command. To remove a RADIUS server from an existing group of RADIUS servers, use the **no** form of this command.

aaa group server radius *name* **server** *ip-address* **[auth-port** *port-number***]**

no aaa group server radius *name* **server** *ip-address* **[auth-port** *port-number***]**

Syntax Description

name	The name of the group of RADIUS servers. Enter a maximum of 31 characters.
ip-address	The IP address of the RADIUS server.
auth-port *port-number*	(Optional) The UDP destination port for authentication requests. If unspecified, the port number defaults to 1645.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to add a RADIUS server to a group of RADIUS servers to be used for AAA authentication. Use the **radius-server host** command to define a RADIUS server for use by the storage router.

During authentication, the servers are accessed in the order in which they are added to the group.

Note Verification of IP addresses in a server group occurs only at runtime. If a RADIUS server group contains an IP address that is not defined as a RADIUS server, the authentication process generates error messages and the IP address is skipped. This could cause unexpected authentication failures.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa group server radius server** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example identifies the servers with IP address *10.5.0.53* and *10.6.0.61* as RADIUS servers, using the default port for authentication. It creates a RADIUS server group named *region2* and adds the previously configured RADIUS servers to the *region2* group.

```
[SN5428-2A]# radius-server host 10.5.0.53
[SN5428-2A]# radius-server host 10.6.0.61
[SN5428-2A]# aaa group server radius region2
[SN5428-2A]# aaa group server radius region2 server 10.5.0.53
[SN5428-2A]# aaa group server radius region2 server 10.6.0.61
```

The following example removes the RADIUS server with IP address *10.5.0.53* from the RADIUS server group named *region2*:

```
[SN5428-2A]# no aaa group server radius region2 server 10.5.0.53
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
aaa test authentication	Enable testing of the specified AAA authentication list.
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
radius-server key	Sets the global authentication and encryption key for all RADIUS communications between the storage router and the RADIUS daemon.
radius-server retransmit	Specifies how many times the storage router resends the RADIUS request to a server before giving up.
radius-server timeout	Sets the interval the storage router waits for a RADIUS server to reply before retransmitting.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.

aaa group server tacacs+

To create a named group of TACACS+ servers to be used for AAA authentication, use the **aaa group server tacacs+** command. To disable an existing group of TACACS+ servers, use the **no** form of this command.

aaa group server tacacs+ *name*

no aaa group server tacacs+ *name*

Syntax Description

name	The name of the group of TACACS+ servers to be used for AAA authentication. Enter a maximum of 31 characters.

Defaults

None. All configured TACACS+ servers belong to the group named *tacacs+*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to create a subset of TACACS+ servers to be used for AAA authentication. The named group can then be added to a AAA authentication methods list, allowing the specified set of TACACS+ servers to be used for authentication. After creating the named group, use the **aaa group server tacacs+ server** command to add a TACACS+ server to the group.

Use the **tacacs-server host** command to configure a TACACS+ server to be used by the storage router for AAA authentication.

Group names must be unique across the storage router; you cannot have a group of TACACS+ servers named *labauth* and a group of RADIUS servers named *labauth*. The default group name of *tacacs+* includes all configured TACACS+ servers.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa group server tacacs+** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example creates a TACACS+ server group named *region3*:

```
[SN5428-2A]# aaa group server tacacs+ region3
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server tacacs+ server	Add the specified TACACS+ server to the named TACACS+ server group.
aaa test authentication	Enable testing of the specified AAA authentication list.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
tacacs-server key	Sets the global authentication and encryption key for all TACACS+ communications between the storage router and the TACACS+ daemon.
tacacs-server timeout	Sets the interval the storage router waits for a TACACS+ server to reply.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.

aaa group server tacacs+ server

To add a TACACS+ server to a named group of TACACS+ servers to be used for AAA authentication, use the **aaa group server tacacs+ server** command. To remove a RADIUS server from an existing group of TACACS+ servers, use the **no** form of this command.

aaa group server tacacs+ *name* **server** *ip-address* **[auth-port** *port-number***]**

no aaa group server tacacs+ *name* **server** *ip-address* **[auth-port** *port-number***]**

Syntax Description

name	The name of the group of TACACS+ servers. Enter a maximum of 31 characters.
ip-address	The IP address of the TACACS+ server.
auth-port *port-number*	(Optional) The server port number. Valid port numbers range from 1 to 65535. If unspecified, the port number defaults to 49.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to add a TACACS+ server to a group of TACACS+ servers to be used for AAA authentication. Use the **tacacs-server host** command to define a TACACS+ server for use by the storage router.

During authentication, the servers are accessed in the order in which they are added to the group.

Note Verification of IP addresses in a server group occurs only at runtime. If a TACACS+ server group contains an IP address that is not defined as a TACACS+ server, the authentication process generates error messages and the IP address is skipped. This could cause unexpected authentication failures.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa group server tacacs+ server** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example identifies the servers with IP address *172.29.39.46* and *10.7.0.72* as TACACS+ servers, using the default port for authentication. It creates a TACACS+ server group named *region3* and adds the previously configured TACACS+ servers to the *region3* group.

```
[SN5428-2A]# tacacs-server host 172.29.39.46
[SN5428-2A]# tacacs-server host 10.7.0.72
[SN5428-2A]# aaa group server tacacs+ region3
[SN5428-2A]# aaa group server tacacs+ region3 server 172.29.39.46
[SN5428-2A]# aaa group server tacacs+ region3 server 10.7.0.72
```

The following example removes the TACACS+ server with IP address *10.7.0.72* from the TACACS+ server group named *region3*:

```
[SN5428-2A]# no aaa group server tacacs+ region3 server 10.7.0.72
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
tacacs-server key	Sets the global authentication and encryption key for all TACACS+ communications between the storage router and the TACACS+ daemon.
tacacs-server timeout	Sets the interval the storage router waits for a TACACS+ server to reply.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.

aaa new-model

To enable the AAA access control model, issue the **aaa new-model** command.

aaa new-model

no aaa new-model

Syntax Description

This command has no arguments or keywords.

Defaults

AAA is enabled. AAA cannot be disabled on the SN 5428-2 Storage Router.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command enables the AAA access control model. The **no aaa new-model** command is available for completeness only; AAA cannot be disabled for the storage router.

AAA authentication services are used to provide the following authentication types:

- iSCSI authentication—provides authentication of IP hosts requiring access to storage via SCSI routing instances
- Login authentication—provides authentication of users requiring Monitor mode access to the storage router via the CLI
- Enable authentication—provides authentication of users requiring Administrator mode access to the storage router via the CLI **enable** command

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa new-model** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example initializes AAA:

```
[SN5428-2A]# aaa new-model
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI enable command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

aaa test authentication

To test authentication using the specified authentication list, use the **aaa test authentication** command.

aaa test authentication {enable | login} default *username password*

aaa test authentication iscsi {*listname* **| default}** *username password*

aaa test authentication cancel

Syntax Description

enable default	Use the services in the Enable authentication list for testing. The name of the list must be *default*.
login default	Use the services in the Login authentication list for testing. The name of the list must be *default*.
iscsi *listname*	Use the services in the named iSCSI authentication list for testing.
iscsi default	Use the services in the iSCSI authentication list for testing. The name of the list must be *default*.
username	The user name to be tested.
password	The password associated with the specified user name.
cancel	Cancel any outstanding test authentication requests.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

AAA uses the services in the specified authentication list to perform Enable, Login or iSCSI authentication. Use this command to test iSCSI authentication prior to enabling authentication for SCSI routing instances or for troubleshooting purposes.

Use the **cancel** keyword to terminate any outstanding test authentication requests. For example, if a RADIUS or TACACS+ server is configured with a very long timeout value, you can cancel the request rather than waiting for the timeout to occur.

In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **aaa test authentication** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example tests iSCSI authentication using the default authentication list for the user named *user1*, with a password of *password1*:

```
[SN5428-2A]# aaa test authentication iscsi default user1 password1
```

The following example tests iSCSI authentication using the authentication list named *webtest1*, for the user named *user2*, with a password of *password2*:

```
[SN5428-2A]# aaa test authentication iscsi webtest1 user2 password2
```

The following example tests Enable authentication for the user named *$enab15$*, with a password of *admin*:

```
[SN5428-2A]# aaa test authentication enable default $enab15$ admin
```

The following example tests Login authentication for the user named *monitor*, with a password of *cisco*:

```
[SN5428-2A]# aaa test authentication login default monitor cisco
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI enable command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

accesslist

To create an access list entity, use the **accesslist** command.

accesslist *name*

Syntax Description

name	The name of the access list entity created by this command. Enter a maximum of 31 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Access lists identify the IP hosts allowed to access a common set of storage resources and are associated with specific storage targets. IP hosts can be identified by:

- IP address
- CHAP user name (used for iSCSI authentication)
- iSCSI Name

An access list can contain one or more types of identification entries. If an identification entry type exists in the access list, the IP host attempting to access the associated storage target must have a matching entry defined in the access list. For example, if an access list contains both IP address and iSCSI Name identification entry types, then every IP host that requires access to the associated set of storage resources must have a matching IP address and iSCSI Name entry in the access list.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

Note If there is a CHAP user name entry in the access list, the SCSI routing instance used to access the storage target must also have iSCSI authentication enabled. See Chapter 9, "Configuring Authentication" for more information about AAA and iSCSI authentication.

In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue an **accesslist** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following command creates an access list named *webserver2*:

```
[SN5428-2A]# accesslist webserver2
```

Related Commands

Command	Description
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist description	Add a description to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

accesslist A.B.C.D/bits

To add the IP address and subnet mask of IP hosts to the named access list, use the **accesslist A.B.C.D/bits** command.

accesslist *name A.B.C.D/bits* | *A.B.C.D/1.2.3.4* [*A.B.C.D/bits* | *A.B.C.D/1.2.3.4*] **. . .**
[*A.B.D.F/bits* | *A.B.C.D/1.2.3.4*]

Syntax Description

name	The name of an access list to which you are adding information.
A.B.C.D/bits	IP address and subnet mask of the IP host being added to the access list. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style.
A.B.C.D/1.2.3.4	The IP address and subnet mask of the IP host being added to the access list. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **accesslist A.B.C.D/bits** command after creating an access list to populate the list with IP address entries. Enter multiple addresses and masks, separating each by a space.

Access lists identify the IP hosts allowed to access a common set of storage resources and are associated with specific storage targets. IP hosts can be identified by:

- IP address
- CHAP user name (used for iSCSI authentication)
- iSCSI Name

An access list can contain one or more types of identification entries. If an identification entry type exists in the access list, the IP host attempting to access the associated storage target must have a matching entry defined in the access list. For example, if an access list contains both IP address and iSCSI Name identification entry types, then every IP host that requires access to the associated set of storage resources must have a matching IP address and iSCSI Name entry in the access list.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue an **accesslist A.B.C.D/bits** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following commands add the specified entries to the named access lists:

```
[SN5428-2A]# accesslist myAccessList 192.168.54.12/32 192.168.54.15/32
*[SN5428-2A]# accesslist Webserver5 209.165.201.1/255.255.255.0
209.165.201.5/255.255.255.0
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist description	Add a description to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

accesslist chap-username

To add the CHAP user name of IP hosts to the named access list, use the **accesslist chap-username** command.

accesslist *name* **chap-username** *username*

Syntax Description

name	The name of an access list to which you are adding information.
username	The CHAP user name (used for iSCSI authentication purposes) configured for the IP host that requires access to storage.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **accesslist chap-username** command after creating an access list to populate the list with CHAP user name entries. A CHAP user name is required for iSCSI authentication.

Access lists identify the IP hosts allowed to access a common set of storage resources and are associated with specific storage targets. IP hosts can be identified by:

- IP address
- CHAP user name (used for iSCSI authentication)
- iSCSI Name

An access list can contain one or more types of identification entries. If an identification entry type exists in the access list, the IP host attempting to access the associated storage target must have a matching entry defined in the access list. For example, if an access list contains both IP address and iSCSI Name identification entry types, then every IP host that requires access to the associated set of storage resources must have a matching IP address and iSCSI Name entry in the access list.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

The iSCSI driver is configured with a CHAP user name and password when SCSI routing instances have iSCSI authentication enabled. AAA authentication services authenticate the IP host using the CHAP user name and password. An access list can also use the CHAP user name to identify IP hosts allowed access to a common set of storage resources.

Note If there is a CHAP user name entry in the access list, the SCSI routing instance used to access the storage target must also have iSCSI authentication enabled. See Chapter 9, "Configuring Authentication" for more information about AAA and iSCSI authentication.

In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue an **accesslist chap-username** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following commands add the specified entries to the named access lists:

```
[SN5428-2A]# accesslist myAccessList chap-username foo
*[SN5428-2A]# accesslist Webserver5 chap-username server1
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist description	Add a description to an access list.
accesslist iscsi-name	Add iSCSI Names to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

accesslist description

To add a description to an existing access list entity, use the **accesslist description** command.

accesslist *name* **description "***text***"**

Syntax Description

name	The name of an existing access list entity.
text	User-defined identification information associated with this access list. Enclose the description string in quotes. Enter a maximum of 64 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Access lists identify the IP hosts allowed to access a common set of storage resources and are associated with specific storage targets. IP hosts can be identified by:

- IP address
- CHAP user name (used for iSCSI authentication)
- iSCSI Name

An access list can contain one or more types of identification entries. If an identification entry type exists in the access list, the IP host attempting to access the associated storage target must have a matching entry defined in the access list. For example, if an access list contains both IP address and iSCSI Name identification entry types, then every IP host that requires access to the associated set of storage resources must have a matching IP address and iSCSI Name entry in the access list.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue an **accesslist description** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following command adds a description to the access list named *webserver2*:

```
[SN5428-2A]# accesslist webserver2 description "Access list for company web servers"
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry, or an entire access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

accesslist iscsi-name

To add the iSCSI Name of IP hosts to the named access list, use the **accesslist iscsi-name** command.

accesslist *name* **iscsi-name** *string*

Syntax Description

name	The name of an access list to which you are adding information.
string	The iSCSI Name of IP host that requires access to storage. The iSCSI Name is a UTF-8 character string based on iSCSI functional requirements. It is a location-independent permanent identifier for an iSCSI node. An iSCSI node can be either an initiator, a target, or both.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **accesslist iscsi-name** command after creating an access list to populate the list with iSCSI Name entries.

If you do not know the iSCSI Name of the IP host, configure the IP host and attempt to access the desired storage targets. Use the **show scsirouter** command with the **host table** keywords to then display the iSCSI Name (along with the initiator alias, IP address and CHAP user name) of all IP hosts that have attempted to access storage resources.

Access lists identify the IP hosts allowed to access a common set of storage resources and are associated with specific storage targets. IP hosts can be identified by:

- IP address
- CHAP user name (used for iSCSI authentication)
- iSCSI Name

An access list can contain one or more types of identification entries. If an identification entry type exists in the access list, the IP host attempting to access the associated storage target must have a matching entry defined in the access list. For example, if an access list contains both IP address and iSCSI Name identification entry types, then every IP host that requires access to the associated set of storage resources must have a matching IP address and iSCSI Name entry in the access list.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue an **accesslist iscsi-name** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following command add the specified iSCSI Name to the access list named *foo*:

```
[SN5428-2A]# accesslist foo iscsi-name ign.1987-05.com.cisco.01.88e8b25a6bf3372a34567123f
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist description	Add a description to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

admin contactinfo

To provide basic contact information for the system administrator of this SN 5428-2 Storage Router, use the **admin contactinfo** command.

admin contactinfo [name "*string*" **| email** "*string*" **| phone** "*string*" **| pager** "*string*"**]**

admin contact info name "*string*" **email** "*string*" **phone** "*string*" **pager** "*string*"

Syntax Description

name *string*	(Optional) The name of the storage router administrator.
email *string*	(Optional) The e-mail address of the storage router administrator. This is an address to which alerts may be sent.
phone *string*	(Optional) The phone number of the storage router administrator.
pager *string*	(Optional) The pager number of the storage router administrator.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **admin contactinfo** command to provide site-specific information for the system administrator of the SN 5428-2 Storage Router. The command accepts each parameter separately, or all parameters together. If all parameters are specified, they must be in the sequence shown. Usage is completely site-specific.

Enclose each string containing spaces in single or double quotes. If a string contains a single quote, enclose it is double quotes; if it contains a double quote, enclose it in single quotes. A string cannot contain both single and double quotes.

Examples

The following commands set the system administrator name and e-mail address:

```
[SN5428-2A]# admin contactinfo name "Pat Hurley"
[SN5428-2A]# admin contactinfo email "hurley@abc123z.com"
```

The following command sets all system administrator contact information:

```
[SN5428-2A]# admin contactinfo name "Chris Smith" email "chris.smith@zxy478x.com" phone
"123.555.5555 ext 97" pager "555.3444 pin 2234"
```

Related Commands

Command	Description
admin password	Set the login password for administrative access to the storage router management interface.
restore system	Restore selected system information from the named configuration file.
save all	Save all configuration information, including the system administrator contact information.
save system	Save selected system configuration information, including the system administrator contact information.
show admin	Display system administrator contact information.

admin password

To set the password used for administrative access to the SN 5428-2 Storage Router management interface, use the **admin password** command. Access may be via Telnet or SSH (for CLI), or web-based GUI.

admin password *string*

Syntax Description

string	The password associated with administrative access to the storage router management interface. The string can be enclosed in quotes, and must be enclosed in quotes if the password includes one or more spaces. A string value of "" clears the password. The default password is *cisco*.

Defaults

The default password is *cisco*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The management interface is password protected. You must enter passwords when accessing the storage router via Telnet or SSH (for CLI) or web-based GUI. The Monitor mode password provides view-only access to the management interface, while the Administrator mode password allows you to create entities and make changes to the configuration of the storage router. Password protection can also be extended to the storage router console, using the **restrict console** command.

The password can contain one or more spaces, if the password string is enclosed in quotes. A string value of "" clears the password, effectively setting it to nothing.

In a cluster environment, the Administrator mode and Monitor mode passwords are cluster-wide configuration elements and apply to all storage routers in a cluster. The password management functions are handled by a single storage router. To determine which storage router is performing password management functions, issue the **show cluster** command. If you issue the **admin password** command from a storage router that is not performing password management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Note The password is displayed in clear text as the command is entered, but it is changed to a series of number signs (**#####**) when the change is acknowledged.

Examples

The following example sets the Administrator mode password to *foo73G*. All passwords are case sensitive.

```
[SN5428-2A]# admin password foo73G
```

The following example sets the Administrator mode password to "*xZm! 673*":

```
[SN5428-2A]# admin password "xZm! 673"
```

Related Commands

Command	Description
aaa generate password	Generate a long random password.
enable	Enter Administrator mode.
exit	Leave Administrator mode and enter Monitor mode.
monitor password	Set the login password for view-only access to the storage router management interface.
restrict console	Enable or disable password checking on the storage router console interface.
save all	Save all configuration information, including the administrator password.
save system	Save selected system configuration information, including the Administrator mode passwords.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.

cdp enable

To enable Cisco Discovery Protocol (CDP) on the SN 5428-2 Storage Router, use the **cdp enable** command. To disable CDP on the storage router, use the **no** form of this command.

cdp enable

no cdp enable

Syntax Description

This command has no arguments or keywords.

Defaults

CDP is enabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

CDP is enabled by default in order to send or receive CDP information. CDP can be switched on or off for each specific interface via the **cdp interface** command.

Examples

The following example enables CDP on the storage router:

```
[SN5428-2A]# cdp enable
```

Related Commands

Command	Description
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.

cdp holdtime

To specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it, use the **cdp holdtime** command. To revert to the default setting, use the **no** form of this command.

cdp holdtime *nn*

no cdp holdtime

Syntax Description

nn	The holdtime to be sent in the CDP update packets, in seconds.

Defaults

The default holdtime is 180 seconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The CDP holdtime must be set to a higher number of seconds than the time between CDP transmissions, which is set using the **cdp timer** command.

Examples

The following example sets the CDP holdtime to 60, meaning that the CDP packet being sent from the storage router should be held by the receiving device for 60 seconds before being discarded. You may want to set the holdtime lower than the default setting of 180 seconds if information about the storage router changes frequently.

```
[SN5428-2A]# cdp holdtime 60
```

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.

cdp interface

To enable CDP for a specific interface, use the **cdp interface** command. To disable CDP for a specific interface, use the **no** form of this command.

cdp interface *if-name* **enable**

no cdp interface *if-name* **enable**

Syntax Description

if-name	The name of the interface for which you are enabling or disabling CDP. CDP can be enabled on the management (mgmt), HA, and Gigabit Ethernet (ge2) interfaces. When you type the **cdp interface ?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
enable	Keyword used to enable CDP for the specified interface.

Defaults

CDP is enabled for all interfaces.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

CDP must be enabled for the SN 5428-2 Storage Router, using the **cdp enable** command, before it can be enabled for a specific interface.

Examples

The following example enables CDP for the Gigabit Ethernet interface, *ge2*:

```
[SN5428-2A]# cdp interface ge2 enable
```

The following example disables CDP for the management interface:

```
[SN5428-2A]# no cdp interface mgmt enable
```

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.

cdp timer

To specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router, use the **cdp timer** command. To revert to the default setting, use the **no** form of this command.

cdp timer *nn*

no cdp timer

Syntax Description

nn	The number of seconds between transmissions of CDP packets from the SN 5428-2 Storage Router.

Defaults

The default is 60 seconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The time between CDP transmissions must be set to a lower number than the CDP holdtime, which is set using the **cdp holdtime** command. There is a trade-off between sending more frequent CDP updates and bandwidth utilization.

Examples

The following example sets the CDP timer to 90, meaning that CDP updates are sent every 90 seconds, which is less frequently than the default of 60 seconds. You may want to make this change if you are concerned about preserving bandwidth.

```
[SN5428-2A]# cdp timer 90
```

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.

clear conf

To return certain configuration settings to factory defaults, use the **clear conf** wizard. The **clear conf** wizard prompts you to enter the Administrator mode password and then to indicate which settings to restore to factory defaults.

clear conf

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **clear conf** wizard is only available when the storage router is deployed for SCSI routing. If the storage router is deployed for transparent SCSI routing, use the **clear conf {all | system}** command to return the storage router configuration to factory default settings.

Follow these guidelines when using the **clear conf** wizard:

- Select **apps** to remove all SCSI routing instances but retain system configuration settings.
- Select **system** to remove all SCSI routing instances and system configuration settings.
- Select **saved** to delete all backup configuration files from disk.
- Select **all** to remove all SCSI routing instances, system configuration settings, and saved configuration files.

The system will reboot if you select **apps**, **system**, or **all**.

System configuration settings include:

- The management and HA interface IP addresses
- Configuration information for Fibre Channel interfaces
- Saved zone configuration information
- Domain name servers
- NTP server and time zone information
- SNMP information
- Administrator and Monitor passwords, and administrator contact information
- AAA authentication configuration information
- VLAN and VTP information

Deleting system configuration makes the storage router unavailable to Telnet, SSH or web-based GUI sessions until the management interface is reconfigured with an IP address via a console connection. See Chapter 2, "First-Time Configuration," for more information about initial system configuration.

Note The **clear conf** wizard will not reset any Secure Shell (SSH) public and private key pairs generated for the storage router. Use the **ssh keygen** command to generate new SSH keys after the storage router is restored to the selected factory default settings.

Examples

The following example removes all SCSI routing instances from the storage router. The system configuration settings are retained.

```
[SN5428-2_A1]# clear conf

Enter admin password: *****

This process can restore factory default settings for the SN5428-2.
* Select "apps" to remove active applications and retain system
  configuration settings.
* Select "system" to remove active applications and system
  configuration settings.
* Select "saved" to remove all backup configurations from disk.
* Select "all" to remove active applications, system configuration,
  and saved configurations.

The system configuration includes the management port, dns, admin and
monitor login, ntp, and snmp. You will need to use the console
to reconfigure the management port if you erase the system configuration.

The system will reboot if you select "apps", "system", or "all".

Erase what? [apps/system/saved/all/cancel (cancel)]apps

Configuration cleared. System configuration settings retained.
System halting.............!

System has been halted
```

Related Commands

Command	Description
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

clear conf {all | system}

To return certain configuration settings to factory defaults, use the **clear conf {all | system}** command.

clear conf {all | system} *password*

Syntax Description

all	Remove all storage router configuration information, including system configuration settings, saved configuration files, SCSI routing and FCIP instances, access lists, and cluster configuration settings.
system	Remove all system configuration settings, SCSI routing instances, access lists and cluster configuration settings. Saved configuration files will be retained.
password	The Administrator mode password.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

System configuration settings include:

- The management and HA interface IP addresses
- Configuration information for Fibre Channel interfaces
- Saved zone configuration information
- Domain name servers
- NTP server and time zone information
- SNMP information
- Administrator and Monitor passwords, and administrator contact information
- AAA authentication information
- VLAN and VTP information

Issuing the **clear conf** command with either the **system** or **all** keyword causes the storage router to reboot.

Deleting system configuration makes the storage router unavailable to Telnet or web-based GUI sessions until the management interface is reconfigured with an IP address via a console connection. See Chapter 2, “First-Time Configuration,” for more information about initial system configuration.

Note The **clear conf** command will not reset any Secure Shell (SSH) public and private key pairs generated for the storage router. Use the **ssh keygen** command to generate new SSH keys after the storage router is restored to the selected factory default settings.

Examples

The following example removes all storage router configuration information, returning the storage router to its initial default configuration. The example uses the default Administrator mode password, *cisco*.

```
[SN5428-2_A1]# clear conf all cisco

Clearing configuration...


Current configuration and named configurations cleared.
System halting.........
```

Related Commands

Command	Description
clear conf	Run the wizard to reset the storage router to factory defaults.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the storage router's high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

clear counters fcip

To clear all counters associated with the specified FCIP instance, or all instances, use the **clear counters fcip** command.

clear counters fcip {*name* | **all**}

Syntax Description

name	The name of the FCIP instance for which counters will be cleared.
all	Clear counters for all FCIP instances.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

This command resets the specified operational statistics. It does not display the accumulated statistics before resetting the counters.

Clear counters before beginning a troubleshooting session, so you can quickly identify the counters that are changing.

Examples

The following example clears the operational counters for the FCIP instance named *fcip1*:

```
[SN5428-2A]# clear counters fcip fcip1
```

The following example clears the operational counters for all FCIP instances:

```
[SN5428-2A]# clear counters fcip all
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

clear counters interface

To clear all counters associated with the specified interface, or all interfaces, use the **clear counters interface** command.

clear counters interface {*if-name* **| all}**

Syntax Description

if-name	The name of the interface. Counters can be cleared for the management (mgmt), Fibre Channel (fc?), FC initiator interfaces (fci?), Gigabit Ethernet (ge?) interfaces, and the high availability (ha) interface (if available). When you type the **clear counters interface ?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
all	Clear counters for all interfaces.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command resets all accumulated operational statistics for the specified interface. Operational statistics can include counters for packets received and transmitted, collisions, octets, multicast packets, dropped and unsupported protocol, exception status IOCBs (such as LIP reset aborts, port unavailable or logged out, DMA errors, port configuration changed, command timeout, data overrun, write or read data underrun, and queue full), Fibre Channel errors, and other general events.

Clear counters before beginning a troubleshooting session, so you can quickly identify the counters that are changing.

Examples

The following example clears all accumulated operational statistics counters for the Fibre Channel interface *fc1*.

```
[SN5428-2A]# clear counters interface fc1
```

Related Commands

Command	Description
show interface	Display operational and configuration information for the specified interface or all interfaces.

clear counters scsirouter

To reset accumulated operational statistics for the specified SCSI routing instance, use the **clear counters scsirouter** command.

clear counters scsirouter {*name* | **all**} {**connection** | **host** | **target** {*name* | **all**}}

Syntax Description

name	The name of the SCSI routing instance for which counters will be cleared.
all	Clear counters for all SCSI routing instances.
connection	Clear operational statistics related to connections only.
host	Clear operational statistics related to currently connected hosts only.
target *name*	Clear operational statistics related to the specified target.
target all	Clear operational statistics related to all targets.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command resets the specified operational statistics. It does not display the accumulated statistics before resetting the counters.

Clear counters before beginning a troubleshooting session, so you can quickly identify the counters that are changing.

Examples

The following example clears the connection counters for the SCSI routing instance *myScsi1*.

```
[SN5428-2A]# clear counters scsirouter myScsi1 connection
```

Related Commands

Command	Description
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

clear fcswitch

To clear the switch log files of all entries or to clear stored zoning configuration information, issue the **clear fcswitch** command.

clear fcswitch {devlog | syslog | zones {fabric | local}}

Syntax Description

devlog	The switch development log file.
syslog	The switch system log file.
zones	Zoning changes received from switches in the fabric and stored by the SN 5428-2 Storage Router.
fabric	Keyword used to clear the local zoning database and deactivate the active zone set for the entire fabric.
local	Keyword used to clear the local zoning database for the storage router only. All ports operating as E_Ports must be inactive before the local zoning configuration is cleared.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Clear the switch development or system log file if it is large, or if you are going to perform testing and want to be sure the switch log files only reflects information from the testing session.

Clear local zoning configuration if you are moving the storage router from one FC switched zoned fabric to another or removing a switch from the fabric, or when other network changes have been made that render the saved zoning information inaccurate. All ports operating as E_Ports must be inactive. If the **clear fcswitch zones local** command is issued when there is an active E_Port on the SN 5428-2 Storage Router, the command fails and issues a warning message indicating the FC interfaces that are currently enabled.

Use the **fabric** keyword to clear the local zoning database and deactivate the active zoneset for the entire fabric.

Examples

The following example clears the switch development log files:

```
[SN5428-2A]# clear fcswitch devlog
```

The following example clears the switch system log files:

```
[SN5428-2A]# clear fcswitch syslog
```

The following example clears all saved zoning information from the storage router local zoning database:

```
[SN5428-2A]# clear fcswitch zones local
```

The following example clears the local zoning database and deactivates the active zone set for the entire fabric:

```
[SN5428-2A]# clear fcswitch zones fabric
```

Related Commands

Command	Description
fcswitch devlog	Specify logging parameters for the switch development log file.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch syslog	Specify logging parameters for the switch system log file.
fcswitch zoning autosave	Configure the storage router to participate in FC switched fabric zones.
show debug fcswitch	Display internal FC interface parameters, including switch log entries.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show fcswitch linkstate	Display information about the storage router link state database.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.

clear log

To clear the SN 5428-2 Storage Router log file of all entries, issue the **clear log** command.

clear log

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1.	This command was introduced.

Usage Guidelines

Clear the storage router log file if it is large, or if you are going to perform testing and want to be sure the log file only reflects information from the testing session.

Examples

The following example clears all entries from the storage router log file:

```
[SN5428-2A]# clear log
```

Related Commands

Command	Description
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.

clear logging table

To clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults, issue the **clear logging table** command.

clear logging table [to factory_defaults]

Syntax Description

to factory_defaults	Return the storage router logging table to the factory default logging rule entries.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1.	This command was introduced.

Usage Guidelines

Use this command to remove all rules for routing storage router event messages. If the logging table is cleared, logging is still enabled but all messages will be discarded.

To return the logging table to the factory default logging rules, use the **to factory_defaults** keywords. The factory default logging rules are as follows:

- All messages from all facilities at notice level or lower levels are logged to all destinations.
- All messages from all facilities at info level of lower levels are logged to the storage router log file.

Examples

The following example clears all entries from the storage router logging table and returns the table to the default logging rules:

```
[SN5428-2A]# clear logging table to factory_defaults
```

Related Commands

Command	Description
delete logging	Delete a rule from the logging table.
logging #?	Insert a routing rule entry into the storage router logging table.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
logging on	Enable or temporarily disable logging of storage router event message.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.

clear scsirouter failover

To clear the primary or secondary storage router from the HA failover list for the specified SCSI routing instance, use the **clear scsirouter** command.

clear scsirouter *name* **failover {primary | secondary}**

Syntax Description

name	The name of the SCSI routing instance.
primary	Delete the current primary storage router from the HA failover list.
secondary	Delete the secondary storage router from the HA failover list.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **clear scsirouter failover** command to reset the primary or secondary storage router on the HA failover list for the specified SCSI routing instance. If there is no primary or secondary storage router configured on the HA failover list when the SCSI routing instance fails over, the cluster attempts to run the instance on the first node that is available based on HA failover eligibility information.

Use the **scsirouter failover** command to add a storage router to the HA failover list.

Note This command causes the SCSI routing instance configuration information to be saved and all nodes in the cluster to be updated.

Examples

The following example removes the current primary storage router from the HA failover list for SCSI routing instance *foo*:

```
[SN5428-2A]# clear scsirouter foo failover primary
```

Related Commands

Command	Description
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
scsirouter failover	Add the storage router to the HA failover list for the specified SCSI routing instance.

clear scsirouter primary

To remove the storage router configured as the primary for the named SCSI routing instance, use the **clear scsirouter primary** command.

clear scsirouter *name* **primary**

Syntax Description

name	The name of the SCSI routing instance.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

At any given time, a SCSI routing instance can run on only one storage router in a cluster. If a SCSI routing instance has the **primary** attribute set, the specified storage router will take over running that instance upon system restart or whenever target and critical resources are available.

If the **primary** attribute is not set, the SCSI routing instance continues running on the node where it was started until it is explicitly stopped (via a **no scsirouter enable** command), it automatically fails over to another storage router in the cluster because targets or critical resources are unavailable, or an explicit **failover scsirouter** command is issued. This is the default behavior.

Examples

The following command removes the storage router configured as the primary for the SCSI routing instance named lab2:

```
[SN5428-2A]# clear scsirouter lab2 primary
```

Related Commands

Command	Description
clear scsirouter failover	Remove the designated primary or secondary storage router from the HA failover list for the specified SCSI routing instance.
scsirouter primary	Identify the storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter failover	Add the storage router to the HA failover list for the specified SCSI routing instance.

clear static

To clear the mapping of the IP host to Fibre Channel (FC) address for the specified World Wide Port Name (WWPN), use the **clear static** command. This command is only available when the storage router is deployed for static transparent SCSI routing.

clear static iscsibindings {all | *xxxxxxxxxxxxxxxx***}**

Syntax Description

iscsibindings all	Clear all IP host to FC address mappings.
iscsibindings *xxxxxxxxxxxxxxxx*	Clear the mapping represented by this WWPN. **Note** WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When using WWPN addresses in this command, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

When the storage router is deployed for static transparent SCSI routing, the IP host to FC address mappings are saved and retained in the storage router when it is restarted. If an IP host will no longer be accessing storage via the SN 5428-2, or if you want the SN 5428-2 to create a new mapping when the IP host logs in again, you can clear an existing mapping. Mappings can only be cleared if they are not currently in use.

To display the mappings that are currently configured in the storage router, use the **show static iscsibindings** command.

Examples

The following example displays the currently configured mappings, and then deletes the mapping for the IP host at IP address 10.1.20.2 (WWPN 280100065338d6c0):

```
[SN5428-2A]# show static iscsibindings
Interface WWPN             Host IP Address  Host Name
--------- ---------------- ---------------- ------------------------------
fci1      280100065338d6c0 10.1.20.2        iscsi.cisco.testlab
fci1      280200065338d6c0 10.1.4.213       iqn.1987-05.com.cisco.02.0AB08....B6E5CCE.WIN1
fci2      290100065338d6c0 10.1.30.100      iqn.1987-05.com.cisco.02.9FD389....36D3D3.NT10

[SN5428-2A]# clear static iscsibindings 280100065338d6c0
Binding cleared for WWPN 280100065338d6c0
```

The following example clears all IP host to FC mappings saved in the storage router. If a mapping is in use by an IP host, the mapping will not be cleared.

```
[SN5428-2A]# clear static iscsibindings all
```

Related Commands

Command	Description
show static	Display the currently configured IP host to FC address mappings saved in the storage router.

clock set

To set the storage router system clock to the given date and time, use the **clock set** command. Date and time information is used for log files and the user interface.

clock set *hh:mm:ss mm dd yyyy*

Syntax Description

hh:mm:ss mm dd yyyy	The current time in hours, minutes, and seconds, followed by the current month, day, and year. For example, 13:55:22 06 22 2001.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If the storage router should synchronize its date and time with a network time protocol (NTP) server, see the **ntp peer** command.

Examples

The following example sets the storage router date and time to June 22, 2001 at 14:39:00.

```
[SN5428-2A]# clock set 14:39:00 06 22 2001
```

Related Commands

Command	Description
clock timezone	Specify the time zone for the storage router.
ntp peer	Specify the name or IP address of the NTP server with which the storage router will synchronize date and time.
setup time	Run the wizard to configure the system date and time.
show clock	Display the current system date and time, including the system timezone.

clock timezone

To specify the time zone for the storage router, use the **clock timezone** command.

clock timezone {*string* | **?**}

Syntax Description

string	A character string representing the time zone of the storage router. For example, *America/Chicago* or *Europe/Amsterdam*.
?	Display a list of all valid time zones. Use any time zone in this list for the *string* parameter to set the storage router to that time zone.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Unless you specify the time zone, the clock setting is assumed to be in Universal time, also known as Greenwich Mean Time (GMT).

You can use the **setup time** wizard to select a time zone, set the clock and date, and identify an NTP server for the storage router.

To use the **clock timezone** command, you must know the appropriate time zone string. Use the "**?**" to display a list of valid time zone strings.

Examples

The following example sets the storage router time zone to US/Mountain:

```
[SN5428-2A]# clock timezone US/Mountain
```

Related Commands

Command	Description
clock set	Set the storage router system clock.
ntp peer	Specify the name or IP address of the NTP server with which the storage router will synchronize date and time.
setup time	Run the wizard to configure the system date and time.
show clock	Display the current system date and time, including the system time zone.

copy

To copy the named configuration file or script file from the specified location to the *savedconfig* or *script* directory, or from the storage router to the specified location, use the **copy** command. The exchange is via HTTP or TFTP. When copying files to the storage router, any file of the same name in the *savedconfig* or *script* directory is overwritten.

copy http://*FileUrl* **{savedconfig:***configfilename* | **script:***scriptfilename***}**

copy tftp://*Location/Directory/Filename* **{savedconfig:***configfilename* | **script:***scriptfilename***}**

copy {savedconfig:*configfilename* **| script:***scriptfilename}* **tftp://***Location/Directory/Filename*

Syntax Description

FileUrl	The URL (including the file name) of the configuration or script file to be copied to the storage router, such as *http://acme/~myhome/allconf.xml*. (In this example, the host name *acme* can be used if the **ip name-server** command was previously issued.) Configuration files are transferred to the *savedconfig* directory; script files are transferred to the *script* directory.
configfilename	The name of the saved configuration file. If the file is being copied from the storage router to a TFTP server, it must exist in the storage router *savedconfig* directory.
scriptfilename	The name of the saved script file. If the file is being copied from the storage router to a TFTP server, it must exist in the storage router *script* directory.
Location/Directory/File name	The name of the TFTP server and default directory, followed by the file name. The file must currently exist in the directory. It will be overwritten by the file copied from the storage router. **Note** If the default directory is *tftpboot*, specify only the name of the TFTP server and the file name.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **copy** command does not affect the running or persistent configuration of the storage router or high availability cluster. However, the **restore** command can be used to copy the contents of a saved configuration file into persistent memory, while the **read script** command can be used to execute the commands in a script file to modify a storage router configuration.

Because TFTP does not require a user name and password, directories and files cannot be created. When you copy a file to a TFTP server, you must have read/write permissions for the complete file path, and the file copied from the storage router must already exist.

Examples

The following example copies the saved configuration file *myFoo.xml* from a server with an IP address of 10.1.40.10 to the storage router. The file name is changed to *myFoo_restore.xml* when it is written to the storage router *savedconfig* directory.

```
[SN5428-2A]# copy http://10.1.40.10/usr/SN5428-2/savedconfig/myFoo.xml
savedconfig:myFoo_restore.xml
```

The following example copies the script file *SN5428-2_Lab* from a server named *acme*. The file name is unchanged when it is written to the storage router *script* directory.

```
[SN5428-2A]# copy http://acme/~myhome/SN5428-2_Lab script:SN5428-2_Lab
```

The following example copies the saved configuration file, *backup_23*, to the *daily_backup* file in the *tftpboot* directory of the *tftp_primary* server. The file, *daily_backup,* must already exist in the *tftpboot* directory of the *tftp_primary* server. This command will overwrite the existing *daily_backup* file.

Note Because the default directory is *tftpboot*, the command does not specify directory information.

```
[SN5428-2A]# copy savedconfig:backup_23 tftp://tftp_primary/daily_backup
```

Related Commands

Commands	Description
read script	Read and execute the CLI commands in the named script file.
restore aaa	Restore AAA authentication services from the named configuration file.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore all	Restore the contents of the named configuration file into memory.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
restore system	Restore selected system information from the named configuration file.
restore vlan	Restore VLAN configuration information from the named configuration file.
save aaa	Save the current AAA configuration information.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or for all VLANs.
show savedconfig	Display the contents of the *savedconfig* directory or the contents of the named configuration file.
show script	Display the contents of the *script* directory or the contents of the named command file.

debug aaa

To enable debugging for authentication, authorization, and accounting (AAA) services, use the **debug aaa** command. To disable debugging for AAA authentication services, use the **no** form of this command.

debug aaa

no debug aaa

Syntax Description

This command has no arguments or keywords.

Defaults

Debugging is not enabled.

Command Modes

Administrator.

Command History

Release	Modifications
3.2.1	This command was introduced.

Usage Guidelines

Use this command to debug problems with iSCSI, Enable and Login authentication or general AAA authentication services. Create log route entries for notification level *debugging* to send the trace and debug messages to the desired destination, using the **logging level** command.

Examples

The following example enables AAA debugging:

```
[SN5428-2A]# debug aaa
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of AAA authentication services.
debug scsirouter	Enable debugging for the named SCSI routing instance.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
restore aaa	Restore AAA configuration services from a saved configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.

debug cmd

To run any operating system command with up to five arguments from the CLI, use the **debug cmd** command.

debug cmd *os-command* [*parameters*]

Syntax Description

os-command	Any valid operating system command. Do not invoke interactive functions.
parameters	Up to five command parameters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modifications
3.2.1	This command was introduced.

Usage Guidelines

The **debug cmd** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example displays usage information for the **debug cmd**:

```
[SN5428-2A]# debug cmd dbgRunOSCmdHelp 0
[SN5428-2A]# debug cmd dbgRunOSCmdHelp 0c 1a c4 3c

Running command dbgRunOSCmdHelp(0xc1ac43c) with args 0 0 0 0 0


CLI usage: debug cmd symbol arg1 .. arg5
  symbol -- any named OS function
  arg1 .. arg5 -- numbers (interpreted as hex) or
                  strings if escaped with an initial '$', such as $fc1
                  Anything that doesn't convert to a number is a string

Return value is 0 = 0x0 (OK)
```

Related Commands

Command	Description
debug aaa	Enable debugging for AAA authentication services.
debug scsirouter	Enable debugging for the named SCSI routing instance.

debug fcip

To enable trace facilities for debugging FCIP instances, use the **debug fcip** command. To disable debugging, use the **no** form of this command.

debug fcip *name* {**mailboxtrace** | **packettrace** *mask*}

no debug fcip *name* **mailboxtrace**

Syntax Description

name	The name of the FCIP instance to be debugged.
mailboxtrace	Keyword, indicating that mail box tracing services will be enabled.
packettrace *mask*	Keyword, indicating that packet tracing services will be enabled. The mask value indicates the traces to capture, in hex. The default value, 0xFFFF, captures all traces. A value of 0x0000 turns off packet tracing.

Defaults

All trace facilities are enabled, by default. The packet trace mask value defaults to 0xFFFF, capturing all traces.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

The **debug fcip** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Use this command to trace traffic associated with the named FCIP instance. Use the **show debug fcip** command to view the trace buffer output. The *mask* value defaults to 0xFFF, all packets are traced. A *mask* value of 0x0000 will turn off packet tracing.

Debug settings are not persistent and will return to default value when the storage router is rebooted. To retain a mask value for packet tracing services, use the **fcip destination config** command with the **pkttracemask** keyword to change the FCIP instance configuration and then save the changes to the storage router bootable configuration.

Examples

The following example enables the debug mail box tracing services for the FCIP instance named *fcip1*:

```
[SN5428-2A]# debug fcip fcip1 mailboxtrace
```

The following example enables the debug packet tracing services for the FCIP instance named *fcip2*. All packets will be traced.

```
[SN5428-2A]# debug fcip fcip2 packettrace 0xffff
```

The following example disables debug mail box tracing services for the FCIP instance named *fcip1*:

```
[SN5428-2A]# no debug fcip fcip1 mailboxtrace
```

The following example turns off all packet tracing services for the FCIP instance named *fcip2*:

```
[SN5428-2A]# debug fcip fcip2 packettrace 0x0000
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
show debug fcip	Display debugging information for the named FCIP instance.

debug interface

To specify the maximum number of firmware dump files that can exist on the storage router for a specified initiator interface, or to remove all existing firmware dump files, use the **debug interface** command.

debug interface *if-name* **{forcefcfwdump | lldrestartfcfw}**

debug interface *if-name* **fwdumpcount** *nn*

debug interface *if-name* **removefwdumps**

Syntax Description

if-name	Enable IP trace for the FC initiator interfaces. When you type the **debug interface ?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
forcefcfwdump	Force a dump of FC firmware. A file named *qlclifwdump01.txt* is created in the */ata4* partition.
lldrestartfcfw	Restart the FC firmware. Any existing connections may be dropped.
fwdumpcount *nn*	Specify the maximum number of times the firmware dump files for the specified interface can be overwritten. If a firmware dump is requested and the dump files cannot be overwritten, the firmware will be restarted but a dump file will not be created. The default is 1.
removefwdumps	Keyword used to clear all existing firmware dump files for the specified interface from the storage router.

Defaults

The maximum number of times firmware dump files can be overwritten for each FC initiator interface is 1.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Best practices suggest clearing all existing firmware dump files for the specified interface before requesting a new firmware dump.

Caution Some **debug interface** commands may perform actions that drop existing connections or otherwise impact normal storage router performance. The **debug interface** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example sets the maximum number of times the firmware dump files for *fci1* can be overwritten to 2:

```
[SN5428-2A]# debug interface fci1 fwdumpcount 2
```

The following example clears all firmware dump files for *fci2*:

```
[SN5428-2A]# debug interface fci2 removefwdumps
```

Related Commands

Command	Description
show debug	Display a variety of debug information or perform specific troubleshooting activities.
show interface	Display operational and configuration information for the specified interface or all interfaces.

debug interface fc?

To configure a variety of operational parameters for the internal FC interface switch ports, use the **debug interface fc?** command. To disable various parameters, use the **no** form of this command.

debug interface *fc?* **{al-fairness | fan-enable |ms-enable} enable**

debug interface *fc?* **default**

debug interface *fc?* **diag**

debug interface *fc?* **enable**

debug interface *fc?* **ext-credit** *nn*

debug interface *fc?* **linkspeed {auto | 1gb | 2gb}**

debug interface *fc?* **loopback {external | internal | online}**

debug interface *fc?* **mfs-bundle enable [timeout** *nn***]**

debug interface *fc?* **type {auto | donor | f-port | fl-port | g-port | gl-port}**

debug interface *fc?* **type tl-port mode {autobridge | autolearn}**

no debug interface *fc?* **{al-fairness | fan-enable | ms-enable} enable**

no debug interface *fc?* **enable**

no debug interface *fc?* **mfs-bundle enable [timeout** *nn***]**

Syntax Description

fc?	The name of the internal FC interface switch port for which you are setting this parameter. Valid values are fc0 and fc15. When you type the **debug interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
al-fairness enable	Keywords, used to enable the fairness algorithm (loop priority) on the named internal switch port.
default	Keyword used to reset the port to default operational parameters.
diag	Keyword used to places the switch port into diagnostic mode for testing purposes.
enable	Keyword used to enable the specified switch port.
ext-credit *nn*	Keywords used to enable the port to use additional data buffer credits. Valid values are 0, 11, 22, 33, 44, 55, 66 and 77. The default is 0, indicating that the port is not enabled for credit extension.
fan-enable enable	Keywords, used to enable Fabric Address Notification (FAN) on the specified switch port.
linkspeed auto	Keywords, indicating that the transfer rate is negotiated.
linkspeed 1gb	Keywords, indicating the transfer rate is fixed at 1 Gbps.
linkspeed 2gb	Keywords, indicating the transfer rate is fixed at 2 Gbps.

loopback external	Keywords, indicating an external test will be performed. The specified port must be in a diagnostic state.
loopback internal	Keywords, indicating an internal test will be performed. The specified port must be in a diagnostic state.
loopback online	Keywords, indicating an online loopback test will be performed. The specified port must be enabled.
mfs-bundle enable	Keywords, used to enable Multi-Frame sequence (MFS) bundling for the named switch port.
timeout *nn*	The timeout value associated with MFS bundling, in milliseconds. Valid values are 10 through 20480. The default timeout value is 10 msecs.
ms-enable enable	Keywords, used to enable GS-3 management server commands for the specified switch port.
type auto	Keywords, indicating the port type is automatically negotiated and functions as a generic loop (GL_Port).
type donor	Keywords, indicating the port type is donor. A donor port places its data buffer credits in a pool that ports configured for credit extension draw on. A donor port is essentially disabled; it cannot be used for FC communication.
type f-port	Keywords, indicating that the port type is fabric. F_Ports are fabric ports.
type fl-port	Keywords, indicating that the port type is fabric loop (also known as “public loop”).
type g-port	Keywords, indicating that the port type is generic and can function as either an F_Port or an E_Port. An E_Port is also known as an “expansion port.”
type gl-port	Keywords, indicating that the port type is generic loop and can function as either an F_Port, FL_Port, or E_Port.
type tl-port	Keywords, indicating that the port type is translated loop.
mode autobridge	Keywords, indicating public targets are made visible to the initiator in a private loop.
mode autolearn	Keywords, indicating targets in a private loop are made visible.

Defaults

The internal FC switch ports have the following default operational characteristics:

- fairness algorithm is disabled (switch has priority)
- Fabric Address Notification (FAN) is enabled
- transfer rate is fixed at 2 Gbps
- Multi-Frame sequence bundling is enabled
- GS-3 management server commands are enabled
- port type is fabric (F_Port)
- credit extension is disabled (ext-credit is set to 0)

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **debug interface fc?** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Caution Changing operational characteristic for the interface FC switch ports can cause unexpected behavior in the storage router.

Examples

The following example places the internal FC switch port *fc0* into diagnostic mode for testing purposes:

```
[SN5428-2A]# debug interface fc0 diag
```

Related Commands

Command	Description
show debug interface fc?	Display debug information for internal FC interface switch ports.

debug interface ge?

To enable packet tracing on a Gigabit Ethernet interface, use the **debug interface ge?** command. To disable packet tracing, use the **no** form of this command.

debug interface *ge?* **trace [pktcnt** *nn***] [pktsize** *nn***] enable**

no debug interface *ge?* **trace enable**

Syntax Description

ge?	Enable IP trace for the specified Gigabit Ethernet interface. When you type the **debug interface ge?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
trace	Keyword indicating IP packet tracing will be enabled.
pktcnt *nn*	(Optional) Specify the maximum number of packets to be traced. *nn* must be a value greater then zero (0). If not specified, a circular trace buffer is used. This is the default.
pktsize *nn*	(Optional) Specify the maximum number of bytes to trace per packet. Valid values are 14 to 1024, inclusive. The default is 128.
enable	Keyword used to enable IP packet tracing.

Defaults

IP packet tracing for all Gigabit Ethernet interfaces is disabled by default. The maximum trace size is 128, and all packets use a circular trace buffer.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **debug interface ge?** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

- Use the **pktcnt** keyword to specify the maximum number of packets to be traced. IP packet tracing will automatically be disabled when the specified number of packets is traced, or the trace buffer fills up. If a packet count is not specified, a circular trace buffer is used. The default trace buffer size is 131072 bytes.
- Use the **pktsize** keyword to specify the maximum number of bytes to trace per packet. This value must be in the range of 14 to 1024. The default number of bytes to trace per packet is 128.
- Use the **show debug interface** command to display statistics about the packet trace and to display the contents of the trace buffer in hex.

Note IP packet tracing must be disabled on the interface before the trace buffer can be displayed.

Examples

The following example enables IP packet tracing on the *ge2* interface:

```
[SN5428-2A]# debug interface ge2 trace enable
```

The following example enables IP packet tracing on *ge1*, for a maximum of 100 packets. A maximum of 200 bytes will be traced per packet.

```
[SN5428-2A]# debug interface ge1 trace pktcnt 100 pktsize 200 enable
```

Related Commands

Command	Description
show debug	Display a variety of debug information or perform specific troubleshooting activities.
show debug interface ge?	Display IP packet trace statistics or the contents of the trace buffer.

debug ip rip

To enable routing information protocol (RIP) debug log message, use the **debug ip rip** command. To disable RIP debug log message, use the **no** form of this command.

debug ip rip

no debug ip rip

Syntax Description

This command has no arguments or keywords.

Defaults

RIP debug log messages are disabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **debug ip rip** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example enables RIP, configures logging to send debug message to all virtual terminal sessions, and then enables RIP debug log messages. The **show ip rip** command is used to verify the running RIP configuration.

```
[SN5428-2A]# ip rip enable
Dec 09 16:12:50: %IP-5-IRMRSAR: RIP Services are running
*[SN5428-2A]# logging level debug from ip to vty
*[SN5428-2A]# debug ip rip
Dec 31 12:52:14: %IP-7-IRRPRL00: RIP Packet received from 10.1.30.1 length 124
Dec 31 12:52:14: %IP-7-IRRPRL01:   command 2 version 1
Dec 31 12:52:14: %IP-7-IRRPRL02:     route af 2, dest 10.1.40.0 mask 0.0.0.0 nextHop
0.0.0.0 metric 2
Dec 31 12:52:14: %IP-7-IRRPRL02:     route af 2, dest 10.1.51.0 mask 0.0.0.0 nextHop
0.0.0.0 metric 1

*[SN5428-2A]# show ip rip
Routing Information Protocol (RIP) Information:
        Invalid Timer: 180
        Enabled Flag:  true
        Debug Flag:    true
        Running Flag:  true
```

Related Commands

Command	Description
ip rip enable	Enable the storage router to learn dynamic routing using the routing information protocol (RIP).
show ip	Display entries from the SN 5428-2 Storage Router routing table, and statistics about the protocols used in the storage router network. Use the **rip** keyword to display RIP configuration information.

debug scsirouter

To enable trace facilities for debugging SCSI routing instances, use the **debug scsirouter** command. To disable debugging, use the **no** form of this command.

debug scsirouter *name* **scsitrace**

no debug scsirouter *name* **scsitrace**

Syntax Description

name	The name of the SCSI routing instance to be debugged.
scsitrace	Keyword indicating tracing services will be enabled.

Defaults

All trace facilities are enabled by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

When enabled at this level, debug tracing will trace traffic to and from all targets associated with the named SCSI routing instance. Use the **show debug scsirouter** command to view the trace buffer output.

Examples

The following example enables debug tracing facilities for a SCSI routing instance named *foo*:

```
[SN5428-2A]# debug scsirouter foo scsitrace
```

Related Commands

Command	Description
debug aaa	Enable debugging for AAA authentication services.
debug scsirouter iscsitrace	Enable iSCSI trace facilities for debugging connections to and from the specified SCSI routing instance.
debug scsirouter target	Enable debugging for a specific SCSI routing instance target and LUN combination.
show debug scsirouter	Display trace buffer output.

debug scsirouter iscsitrace

To enable trace facilities for debugging iSCSI connections to and from SCSI routing instances, use the **debug scsirouter iscsitrace** command. To disable iSCSI trace facilities, use the **no** form of this command.

debug scsirouter *name* **iscsitrace [fromto {***A.B.C.D/bits* **|** *A.B.C.D/1.2.3.4***}] [pducnt** *nn***] [pdusize** *nn***] enable**

no debug scsirouter *name* **iscsitrace enable**

Syntax Description

name	The name of the SCSI routing instance to be debugged.
fromto *A.B.C.D/bits*	(Optional) Trace iSCSI Protocol Data Units (PDUs) from and to the specified host or network. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style.
fromto *A.B.C.D/1.2.3.4*	(Optional) Trace iSCSI PDUs from and to the specified host or network. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.
pducnt *nn*	(Optional) Specify the maximum number of PDUs to trace.
pdusize *nn*	(Optional) Specify the maximum trace size per PDU, in bytes.
enable	Enable iSCSI trace facilities.

Defaults

The following are the default iSCSI trace options:

- All client connections to and from the specified SCSI routing instance are traced.
- The maximum trace size per PDU is 48 bytes.
- All PDUs are traced (circular).
- The trace buffer size is 131072 bytes. This value cannot be changed.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

The **debug scsirouter iscsitrace** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Use the **show debug scsirouter** command with the **iscsitrace** keyword to display iSCSI trace information.

Examples

The following example enables iSCSI trace facilities for the SCSI routing instance named *zeus*, using the default iSCSI trace options:

```
[SN5428-2A]# debug scsirouter zeus iscsitrace enable
```

Related Commands

Command	Description
debug scsirouter	Enable debugging for the named SCSI routing instance.
debug scsirouter target	Enable debugging for a specific SCSI routing instance target and LUN combination.
show debug scsirouter	Display trace buffer output.

debug scsirouter target

To enable trace facilities for debugging a specific SCSI routing instance target and LUN combination, use the **debug scsirouter target** command. To disable debugging, use the **no debug scsirouter target** form of this command.

debug scsirouter *name* **target** *name* **lun** *nn* **scsitrace**

no debug scsirouter *name* **target** *name* **lun** *nn* **scsitrace**

Syntax Description

name	The name of the SCSI routing instance to be debugged.
target *name*	The name of the target to be included in the trace.
lun *nn*	The specific LUN associated with the target.
scsitrace	Keyword indicating tracing services will be enabled.

Defaults

All trace facilities are enabled by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

When enabled at this level, SCSI tracing will trace traffic to and from the specified target and LUN combination associated with the named SCSI routing instance. Use the **show debug scsirouter** command to view the trace buffer output.

Examples

The following example enables SCSI tracing facilities for the target and LUN combination *myTarget*, LUN 0, associated with the SCSI routing instance named *foo*:

```
[SN5428-2A]# debug scsirouter foo target myTarget lun 0 scsitrace
```

Related Commands

Command	Description
debug aaa	Enable debugging for AAA authentication services.
debug scsirouter	Enable debugging for the named SCSI routing instance.
debug scsirouter iscsitrace	Enable iSCSI trace facilities for debugging connections to and from the specified SCSI routing instance.
show debug scsirouter	Display trace buffer output.

delete accesslist

To delete an entire access list, all access lists, or a specified entry from the named access list, use the **delete accesslist** command. This command does not change the persistent storage router configuration until the relevant configuration information has been saved using the appropriate **save** command with the **bootconfig** keyword.

delete accesslist all

delete accesslist *name* **[***A.B.C.D/bits* **|** *A.B.C.D/1.2.3.4***]**

delete accesslist *name* **[chap-username** *username* **| iscsi-name** *string***]**

delete accesslist *name* **all**

Syntax Description

name	The name of the access list.
A.B.C.D/bits	(Optional) IP address and subnet mask of the IP host being deleted from the access list. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style.
A.B.C.D/1.2.3.4	(Optional) IP address and subnet mask of the IP host being deleted from the access list. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.
chap-username *username*	(Optional) The CHAP user name configured for the IP host being deleted from the access list. The CHAP user name is used for iSCSI authentication purposes.
iscsi-name *string*	(Optional) The iSCSI Name of the IP host being deleted from the access list.
name **all**	Delete all entries from the named access list.
all	Delete all access lists.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Because access lists are cluster entities, this operation affects all targets associated with this access list, regardless of where the associated SCSI routing instance is running within the high availability cluster.

- Use the **delete accesslist** *name* **all** to clear all entries from the access list, but retain the access list entity.
- Use the **delete accesslist** *name* command with no additional parameters to completely delete the named access list. Before completely deleting an access list, verify that it is no longer associated with any SCSI routing instance target.

Changes to access lists do not impact currently connected IP hosts; changes are effective for all subsequent connections.

Note If you delete an access list that is still associated with a SCSI routing instance target, the target remains bound to the access list, but subsequent connection requests by IP hosts will be rejected (as if the **scsirouter target accesslist none** command had been issued). Use the **show scsirouter** command with the **target** keyword to view access lists associated with SCSI routing instance targets.

In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue a **delete accesslist** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information on operating the storage router in a cluster.

Examples

The following example completely deletes the access list named *fooList* from the currently running configuration:

```
[SN5428-2A]# delete accesslist fooList
```

The following example deletes all entries from the access list named *fooList1*. The access list entity itself is not deleted from the currently running configuration:

```
[SN5428-2A]# delete accesslist fooList1 all
```

The following example deletes all access lists from the currently running configuration:

```
[SN5428-2A]# delete accesslist all
```

The following example deletes the specified IP address from the named access list, *fooList2*. This command does not update the bootable configuration of the storage router until a **save accesslist bootconfig** or **save all bootconfig** command is issued.

```
[SN5428-2A]# delete fooList2 192.168.54.12/32
```

The following example deletes the specified CHAP user name from the named accesslist, *fooList3*. This command does not update the bootable configuration of the storage router until a **save accesslist bootconfig** or **save all bootconfig** command is issued.

```
[SN5428-2A]# delete fooList3 chap-username webserver15
```

The following example deletes the specified iSCSI Name from the named accesslist, *fooList4*. This command does not update the bootable configuration of the storage router until a **save accesslist bootconfig** or **save all bootconfig** command is issued.

```
[SN5428-2A]# delete fooList4 iscsi-name ign.1987-05.com.cisco.01.8838a325b4017f
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or for all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing target or all targets.
show accesslist	Display the contents of the named access list or all access lists.

delete fcalias

To delete the named alias, or the specified member WWPN from the named alias, use the **delete fcalias** command.

delete fcalias *alias-name* **[member wwpn** *xxxxxxxxxxxxxxx***]**

Syntax Description

alias-name	The name of the alias.
member wwpn *xxxxxxxxxxxxxxx*	The WWPN of the alias member. **Note** WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When entering WWPN addresses, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An alias is a collection of Fibre Channel devices, such as switches, initiators, storage and other SN 5428-2 Storage Routers, that can be zoned together. An alias is not a zone and cannot include a zone or another alias as a member.

Use this command to delete an entire alias and all its members from the zoning database, or to delete a specified member WWPN from an alias.

If the alias is a member of the active zone set, the alias will not be removed from the active zone set until the active zone set is deactivated. Use the **no zoneset** command with the **enable** keyword to deactivate the active zone set.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including the deletion of an alias) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC fabric zoning.

Examples

The following example deletes the alias named *AliasFoo* and all its members. The alias will be removed from all zone sets in which it is used.

```
[SN5428-2A]# delete fcalias AliasFoo
```

The following example deletes the member WWPN *21000004ed4105ab* from the alias *AliasFoo*:

```
[SN5428-2A]# delete fcalias AliasFoo member wwpn 21000004ed4105ab
```

Related Commands

Command	Description
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
show fcalias	Display information about aliases and their members.

delete fcip

To delete the named elements from the FCIP instance, or to delete the named instance or all FCIP instances, use the **delete fcip** command. This command does not change the persistent storage router configuration until the relevant configuration information has been saved using the appropriate **save** command with the **bootconfig** keyword.

delete fcip {*name* | **all**}

delete fcip *name* **destination** *name*

Syntax Description

name	The name of the FCIP instance.
all	Keyword, used to delete all FCIP instances from the storage router. **Note** You are not prompted to confirm your actions.
destination *name*	The name of the specific destination to delete.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

Use this command if you want to reconfigure the FCIP instance. You can delete the peer destination or the entire FCIP instance, or all FCIP instances. You must save the configuration changes to update the storage router bootable configuration.

Examples

The following examples deletes a destination named *dest2* from the FCIP instance, *fcip2*:

```
[SN5428-2A]# delete fcip fcip2 destination dest2
```

The following example deletes all FCIP instances:

```
[SN5428-2A]# delete fcip all
```

The following example deletes the FCIP instance named *fcip1*:

```
[SN5428-2A]# delete fcip fcip1
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

delete logging

To delete a rule from the logging table, use the **delete logging** command.

delete logging level *notification-level* **from** *facility-name*

delete logging #?

delete logging #*nn*

Syntax Description

level *notification-level*	The notification level of the routing rules entry to be deleted. See Table 12-4 in the Usage Guidelines section for a list of valid names that can be used for the *notification-level* argument.
from *facility-name*	The name of the facility. A facility is the feature area from which the message is received. See Table 12-5 in the Usage Guidelines section for a list of valid facility names.
#?	Request an indexed list of entries in the logging table.
#*nn*	The index number from the displayed list of entries. The specified routing rule will be deleted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Event, trace and debug messages can be routed to various destinations, based on the notification level of the message and the application area (facility) that generated the message. When a log message is received by the storage router, the logging table rules are searched by facility name and by message level until a match is found. The log message is sent to all the destinations specified by the matching rule.

Use this command to delete logging rules based on notification level and facility name, or by index number.

To display an indexed lists of entries in the logging table, use the number sign (#) character followed by a question mark (?). That action will cause the routing rules in the logging table to be displayed as a numbered (indexed) set of lines. The command is displayed at the prompt below the list to the point of the # keyword. Complete the command by entering the appropriate index number. The specified routing rule will be deleted.

The level limits logging to messages of the specified level or lower levels, based on level number. Table 12-4 describes the available logging levels.

Table 12-4 Logging Level Notification Levels and Corresponding Numbers

Notification Level	Level Number	Description
emergency	0	System unusable
alert	1	Immediate action needed
critical	2	Critical conditions
error	3	Error conditions
warning	4	Non-fatal warning conditions
notice	5	Normal but significant conditions
info	6	Informational messages only
debug	7	Information for troubleshooting purposes

Note The debug notification level should be used for specific troubleshooting purposes only. System performance and HA behavior may be adversely affected by logging at the debug notification level.

Each facility can have up to eight notification levels. Each facility and notification level pair can have up to seven destinations. Table 12-5 describes the available facility names.

Table 12-5 Logging Level Facilities

Facility Name	Description
all	All facilities.
AUTH	AAA authentication.
CDP	Cisco Discovery Protocol.
CONF	Configuration functions.
FC	Fibre Channel interfaces.
FCIP	FCIP functions.
GE	Gigabit Ethernet interfaces.
HA	High availability cluster functions.
IF	Interface manager.
INVALID	Generic functions.
IP	IP functions.
ISCSI	iSCSI functions.
MON	Hardware monitor.
SLP	Service Location Protocol service functions.
SNMP	Simple Network Management Protocol.
SYSLOG	Syslog functions.
UI	User interface functions.
VTP	VTP and VLAN functions.

Use the **save system bootconfig** or **save all bootconfig** commands to save the updated logging table.

Examples

The following example displays the logging table and then deletes the routing rule entry for messages at level *info* from facility *all*:

```
[SN5428-2A]# show logging
Logging is enabled

Index Level     Priority Facility   Route
1     info      6        all        console logfile
2     debug     7        HA         logfile rslog

Syslog host is enabled, ip-address is 10.1.1.144

[SN5428-2A]# delete logging level info from all
```

The following example displays an indexed list of the routing rules in the logging table and then deletes the third entry:

```
[SN5428-2A]# delete logging #?

Logging is enabled

Index Level     Priority Facility   Route
1     critical  2        all        console logfile
2     debug     7        SNMP       rslog
3     notice    5        HA         all
4     warning   4        CDP        rslog

Syslog host is enabled, ip-address is 10.1.1.144

[SN5428-2A]# delete logging #3
```

Related Commands

Command	Description
clear logging table	Clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults.
logging #?	Insert a routing rule entry into the storage router logging table.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
logging on	Enable or temporarily disable logging of storage router event message.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.

delete savedconfig

To remove the named file from the *savedconfig* directory, use the **delete savedconfig** command.

delete savedconfig {*filename* **| all}**

Syntax Description

filename	The name of the configuration file to be deleted. This file must exist in the *savedconfig* directory.
all	Keyword, indicating that all configuration files in the *savedconfig* directory are to be deleted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show savedconfig** command to display the contents of the *savedconfig* directory.

Examples

The following example removes the configuration file named *foo_config* from the storage router:

```
[SN5428-2A]# delete savedconfig foo_config
```

Related Commands

Command	Description
copy	Copy the named configuration or script file from a remote location to the storage router, or from the storage router to a remote location.
restore all	Restore the contents of the named configuration file into memory.
save all	Save all configuration information.
save system	Save selected system configuration information
show savedconfig	Display the contents of the *savedconfig* directory or the contents of the named configuration file.
show script	Display the contents of the script directory or the contents of the named command file.

delete script

To remove the named command file from the *script* directory, use the **delete script** command.

delete script {*filename* | **all**}

Syntax Description

filename	The name of the command file to be deleted. This file must exist in the *script* directory.
all	Keyword, indicating that all command files in the *script* directory are to be deleted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show script** command to display the contents of the *script* directory or the specified command file.

Examples

The following example removes the command file named *foo_script* from the storage router:

```
[SN5428-2A]# delete script foo_script
```

Related Commands

Command	Description
copy	Copy the named configuration or script file from a remote location to the storage router, or from the storage router to a remote location.
read script	Read and execute the CLI commands in the named script file.
restore all	Restore the contents of the named configuration file into memory.
save all	Save all configuration information.
save system	Save selected system configuration information.
show bootconfig	Display the bootable configuration, or create a command file based on the bootable configuration.
show runningconfig	Display the running configuration, or create a command file based on the running configuration.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.
show script	Display the contents of the script directory or the contents of the named command file.

delete scsirouter

To delete the named elements from the SCSI routing instance, use the **delete scsirouter** command. This command does not change the persistent storage router configuration until the relevant configuration information has been saved using the appropriate **save** command with the **bootconfig** keyword.

delete scsirouter {*name* | **all**} [**connection** *nn* | **serverif** *ge?* [**vlan** *vid*]]

delete scsirouter {*name* | **all**} **serverif** *ge?* **force**

delete scsirouter {*name* | **all**} **target** {*name* | **all**} [**lun** *nn*]

delete scsirouter {*name* | **all**} **target** {*name* | **all**} [**lun** *nn*] **force**

delete scsirouter {*name* | **all**} **force**

delete scsirouter *name* **all**

Syntax Description

name	The name of the SCSI routing instance.
all	Delete all SCSI routing instances from the storage router, or delete all attributes for the named SCSI routing instance. **Note** You are not prompted to confirm your actions.
connection *nn*	(Optional) Delete the specified connection from the named instance or all instances. Use the **show scsirouter** command with the **connection** keyword to display connection IDs.
serverif *ge?*	(Optional) Delete the server interface for the named SCSI routing instance or all instances.
vlan *vid*	(Optional) Delete the specified VLAN from the named SCSI routing instance or all instances.
target *name*	The name of the specific target to delete.
target all	Delete all targets from the named instance.
lun *nn*	(Optional) Delete the specified iSCSI LUN from the named target or all targets.
force	(Optional) Keyword that overrides normal protections, allowing the action to be performed.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

In a cluster environment, changes to the SCSI routing instance can only be made on the storage router that is the currently running that instance. The SCSI routing instance may be in a stopped state at the time it is deleted.

The **force** option allows the SCSI routing instance to be deleted from a storage router that is not currently running the instance. The **force** option should only be used when the storage router, or a specific SCSI routing instance, is in an abnormal state and cannot be recovered without rebooting.

When used with the target or LUN keywords, the **force** option allows the specified object to be deleted, even if in use by an iSCSI driver. Under normal circumstances, a target or LUN cannot be deleted if an iSCSI driver is logged in.

Use the **all** keyword to delete all attributes of a named SCSI routing instance. The named SCSI routing instance, however, is not deleted.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Examples

The following example deletes all targets associated with the SCSI routing instance named *foo*:

```
[SN5428-2A]# delete scsirouter foo target all
```

The following example deletes the specified VLAN from the Gigabit Ethernet interface, *ge2*, used by the SCSI routing instance named *foo2*:

```
[SN5428-2A]# delete scsirouter foo2 serverif ge2 vlan 101
```

The following example deletes all attributes of the SCSI routing instance named *foo3*. The SCSI routing instance named *foo3* remains available for configuration on the storage router.

```
[SN5428-2A]# delete scsirouter foo3 all
```

The following example deletes the entire SCSI routing instance named *foo4*:

```
[SN5428-2A]# delete scsirouter foo4
```

Note All examples update the currently running configuration only. To make a deletion permanent, issue the appropriate **save all bootconfig** or **save scsirouter bootconfig** command.

Related Commands

Command	Description
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Start and stop the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target maxcmdqueuedepth	Specify the maximum number of commands allowed at any given time from each iSCSI session to the specified target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

delete software version

To delete a version of software from the storage router, use the **delete software version** command.

Note The version of software currently running and the version that will be booted when the system is restarted may not be deleted.

delete software version {*v.x.y* **| all}**

Syntax Description

v.x.y	The version of storage router software to be deleted.
all	Delete all non-bootable and non-current software versions.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to remove old versions of software from the storage router.

Examples

The following example removes version 2.0.1 from the storage router:

```
[SN5428-2A]# delete software version 2.0.1
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
software http url	Specify the default location from which to download updated storage router software via HTTP.
software proxy url	Specify the default location from which to download updated storage router software via HTTP, using a proxy server.
software tftp	Specify the default location from which to download updated storage router software via TFTP.
verify software version	Check the specified software version for problems.

delete zone

To delete the specified Fibre Channel (FC) zone or the specified member of the zone from the zoning database, use the **delete zone** command.

delete zone *name* **[member {fcalias** *alias-name* **| fcid** *port-id* **| wwpn** *xxxxxxxxxxxxxxxx***}]**

Syntax Description

name	The name of the zone.
member	(Optional) Keyword, indicating the specified zone member will be deleted.
fcalias *alias-name*	Deletes the named alias member from the named zone.
fcid *port-id*	Deletes the specified Port ID member from the named zone.
wwpn *xxxxxxxxxxxxxxxx*	Deletes the specified WWPN member from the named zone. **Note** WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When entering WWPN addresses, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A zone is a group of FC ports or devices, such as switches, storage or SN 5428-2 Storage Routers, grouped together to control the exchange of information.

Use this command to delete the specified zone from the zoning database. If the zone is a member of the active zone set, the zone will not be removed from the active zone set until the active zone set is deactivated. Use the **no zoneset** command with the **enable** keyword to disable the active zone set.

Use the **member** keyword to delete the specified alias, Port ID or WWPN member from the named zone.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including the deletion of a zone or zone member) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC fabric zoning.

Examples

The following example deletes the zone named *testlab* from the zoning database:

```
[SN5428-2A]# delete zone testlab
```

The following example deletes the alias member *myfoo* from the zone *webservices*:

```
[SN5428-2A]# delete zone webservices member fcalias myfoo
```

Related Commands

Command	Description
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset zone	Add a member zone to a zone set.

delete zoneset

To delete the specified zone from the zone set or to delete the entire named zone set from the zoning database, use the **delete zoneset** command.

delete zoneset *name* **[zone** *name***]**

Syntax Description

name	The name of the zone set.
zone *name*	(Optional) Deletes the named zone from the specified zone set.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A zone set is a group of zones. Zoning enables you to divide the ports and devices of the Fibre Channel fabric into zones for more efficient and secure communication among functionally grouped nodes. Only one zone set can be active at a time. The active zone set defines the zoning for the Fibre Channel fabric.

Use this command to delete an entire zone set from the zoning database or only the named zone from the zone set. If the zone set is active, the command does not take effect until the zone set is deactivated. Use the **no zoneset** command with the **enable** keyword to disable the active zone set.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including the deletion of a zone set) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC fabric zoning.

Examples

The following example deletes the zone set named *testgroup*:

```
[SN5428-2A]# delete zoneset testgroup
```

The following example deletes the zone named *zoneA* from the zoneset named *testgroupA*:

```
[SN5428-2A]# delete zoneset testgroupA zone zoneA
```

Related Commands

Command	Description
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset zone	Add a member zone to a zone set.

download software

To fetch the specified object from the named location or the default download location, use the **download software list** command.

download software {http | proxy} {list | url *full_url* **| version** *v.x.y***}**

download software tftp {hostname *host* **filename** *file* **| list | version** *v.x.y***}**

Syntax Description

http	Download using the HTTP protocol.
proxy	Download using a proxy server.
list	(Optional) Download a list of available versions.
url	(Optional) Keyword indicating that the download is from the specified URL.
full_url	The fully qualified URL from which to download this version of storage router software. For example, http://anywebserver.com/3.3.1-K9.tar.
version *v.x.y*	(Optional) Download the specified version of storage router software from the default location.
tftp	Download using the TFTP protocol
hostname *host*	The name of the TFTP host.
filename *file*	The name of the file to be downloaded, such as *3.3.1-K9.tar*. This file contains the storage router software.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The list of available software versions is stored in the file named *sw-sn5428-2-versions.txt*. This text file must contain one line for each version of software that is available from the download location. If you store and download software from a site other than the system default (http://www.cisco.com), create this file and update it whenever a new version of software is available.

Software is either downloaded from the default locations set for the specified protocol or from the location specified as part of the command. Always verify software after it has downloaded to assure no errors were encountered. See “Installing Updated Software” for details on verification and making updated software available to the storage router.

A maximum of two versions of software can be stored on the SN 5428-2 Storage Router.

Note While the size of the software file may vary, it will exceed 16 MB. Some older TFTP implementations have a 16 MB download limitation.

Examples

The following example downloads storage router software version 3.3.1-K9 from the default location via standard Hypertext Transfer Protocol (HTTP):

```
[SN5428-2A]# download software http version 3.3.1-K9
```

The following example downloads a file named *sn5428-2v331.tar* from the TFTP host named *my_tftpHost*. The file must exist in the default TFTP directory.

```
[SN5428-2A]# download software tftp hostname my_tftpHost filename sn5428-2v331.tar
```

The following file downloads the list of available software from the default location using the proxy configuration:

```
[SN5428-2A]# download software proxy list
```

Related Commands

Command	Description
delete software version	Remove the specified version of software from the storage router.
software http url	Specify the default location from which to download updated storage router software via HTTP.
software http username	Configure the user name and optional password required to access the default download location.
software proxy	Configure HTTP proxy information.
software proxy url	Specify the default location from which to download updated storage router software via HTTP, using a proxy server.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software tftp	Specify the default location from which to download updated storage router software via TFTP.
verify software version	Check the specified software version for problems.

enable

To change the management session from Monitor mode to Administrator mode, use the **enable** command. Monitor mode, which is the default mode, provides view-only access to the storage router management interface. Administrator mode allows you to create entities and make changes to the configuration of the storage router.

enable

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Issue the **enable** command after a successful CLI login to change to Administrator mode. You are prompted to enter the Administrator mode password, if required. Use the **exit** command to return to Monitor mode.

Examples

The following example changes the session from Monitor mode to Administrator mode.

```
[SN5428-2A]# enable

Enter admin password: *****
[Entering Administrator mode]
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
exit	Leave Administrator mode and enter Monitor mode.
logout	Terminate the management session.
show aaa	Display AAA configuration information.

exit

To return the management session to Monitor mode from Administrator mode, use the **exit** command.

exit

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Issue the **exit** command to return to Monitor mode after previously issuing the **enable** command.

Examples

The following example returns the CLI session to Monitor mode:

```
[SN5428-2A]# exit
[Leaving Administrator mode]
```

Related Commands

Command	Description
enable	Enter Administrator mode.
logout	Terminate the management session.

failover eligibility

To enable failover by eligibility for all SCSI routing instances running on the storage router, use the **failover eligibility** command. To disable failover by eligibility, use the **no** form of this command.

failover eligibility on

no failover eligibility on

Syntax Description

on	Keyword used to enable failover by eligibility for all SCSI routing instances running on the storage router.

Defaults

Failover by eligibility is enabled.

Command Modes

Administrator mode.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Each storage router in a cluster maintains and exchanges information about available resources. Failover by eligibility is enabled by default; HA bases the decision to automatically fail over a SCSI routing instance to another node in a cluster based on the Fibre Channel and other resources available to that SCSI routing instance.

Failover occurs when:

- All mapped targets are unavailable or a critical resource for the SCSI routing instance is unavailable, and some or all mapped targets would be available from another node in the cluster. A critical resource can be a configured Gigabit Ethernet interface, a required Fibre Channel interface, or an internal resource needed to run the SCSI routing instance.
- Some mapped targets are unavailable and all mapped targets are available on another node in the cluster.
- All mapped targets are available, but another node in the cluster also has all targets available and is designated at the primary for the SCSI routing instance.
- The storage router stops receiving heartbeats from another node within the cluster.

For more manual control over where a SCSI routing instance runs, use the **no failover eligibility on** command to prevent failover by eligibility on a storage router. If a SCSI routing instance is running on (or fails over to) a storage router that is configured with failover by eligibility turned off, it will continue running on that storage router unless there are no mapped targets available or a critical resource is unavailable.

Use the **failover eligibility on** command to restore normal failover functions.

The failover eligibility setting is not retained across a reboot; restarting the storage router restores the default setting (failover by eligibility is enabled).

Examples

The following example disables failover by eligibility for all SCSI routing instances running on the storage router named SN 5428-2A:

```
[SN5428-2A] no failover eligibility on
```

Related Commands

Command	Description
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
show ha	Display HA operational statistics for the storage router or for a specific application.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

failover scsirouter

To cause the named SCSI routing instance to cease running on this storage router and start running on another storage router in the cluster, use the **failover scsirouter** command.

Note If no eligible storage router is found, the SCSI routing instance will start running again on the same node. If the storage router is configured as a standalone system, failover is not allowed.

failover scsirouter *name* **[pri | sec | to** *systemname***]**

failover scsirouter all [to *systemname***]**

Syntax Description

name	The name of the SCSI routing instance to be failed over.
all	Failover all instances currently running on this storage router.
pri	(Optional) Force failover to the designated primary storage router on the failover list.
sec	(Optional) Force failover to the designated secondary storage router on the failover list.
to *systemname*	(Optional) Perform the failover to the specified storage router. This node must be active in the cluster.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **all** keyword to failover all SCSI routing instances currently running on this storage router. Each storage router can run a maximum of 12 SCSI routing instances; there is a maximum of 12 SCSI routing instances per cluster.

Examples

The following example causes the SCSI routing instance named *foo* to failover to another storage router in the cluster:

```
[SN5428-2A]# failover scsirouter foo
```

The following example causes all SCSI routing instances to failover to the storage router named *TestLab1*:

```
[SN5428-2A]# failover scsirouter all to TestLab1
```

Related Commands

Command	Description
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter failover	Add the storage router to the HA failover list for the specified SCSI routing instance.
setup cluster	Change the configuration of the high availability environment.

fcalias

To create an alias entity for use in Fibre Channel zoning, use the **fcalias** command. An alias is a group of FC ports or devices (such as switches, storage or SN 5428-2 Storage Routers) that are grouped together for convenience.

fcalias *alias-name*

Syntax Description

alias-name	The name of the alias entity created by this command. Enter a maximum of 31 characters. The name must begin with an alpha character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An alias allows you to group FC ports and devices together for zoning purposes. Unlike zones, however, aliases do not impose any communication restrictions on its members. An alias can belong to one or more zones, but a zone cannot be a member of an alias, nor can an alias be a member of another alias.

You must create a named alias entity before you can add members to the alias.

A default alias of *iscsi* is provided that contains both initiators WWPN1 and WWPN2.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including the creation of an alias) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC fabric zoning.

Examples

The following example creates an alias entity named *LabGroupA*:

```
[SN5428-2A]# fcalias LabGroupA
```

Related Commands

Command	Description
delete fcalias	Delete the named alias or the specified alias member.
fcalias member	Add the specified member to the named alias.
show fcalias	Display information about aliases and their members.
zone member	Add a device or an alias to a zone.

fcalias member

To add the specified member to the named alias, use the **fcalias member** command. An alias is a group of FC ports or devices (such as switches, storage or SN 5428-2 Storage Routers) that are grouped together for convenience.

fcalias *alias-name* **member wwpn** *xxxxxxxxxxxxxxx*

Syntax Description

alias-name	The name of the alias entity.
wwpn *xxxxxxxxxxxxxxx*	The World Wide Port Name (WWPN) of the port or device to be added to the alias. **Note** WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When entering WWPN addresses, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An alias allows you to group FC ports and devices together for zoning purposes. Unlike zones, however, aliases do not impose any communication restrictions on its members. An alias can belong to one or more zones, but a zone cannot be a member of an alias, nor can an alias be a member of another alias.

The command verifies the format of the WWPN, but does not verify that the specified device exists. A default alias of *iscsi* is provided that contains both initiators WWPN1 and WWPN2.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including adding a member to an alias) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC fabric zoning.

Examples

The following example creates the alias named *LabGroupA*, and then adds the devices with the WWPN *2200001026558a0f* and *220000201744ab3c* to the named alias:

```
[SN5428-2A]# fcalias LabGroupA
[SN5428-2A]# fcalias LabGroupA member wwpn 2200001026558a0f
[SN5428-2A]# fcalias LabGroupA member wwpn 220000201744ab3c
```

Related Commands

Command	Description
delete fcalias	Delete the named alias or the specified alias member.
fcalias	Create an alias entity for use in Fibre Channel zoning.
show fcalias	Display information about aliases and their members.
zone member	Add a device or an alias to a zone.

fcip

To create an FCIP instance, use the **fcip** command.

fcip *name*

Syntax Description

name	The name of the FCIP instance. Valid named are *fcip1* and *fcip2*.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

FCIP provides connectivity between SANs. Technically, it employs Fibre Channel over TCP/IP (FCIP) to provide block oriented FC devices connectivity over an IP network. FCIP allows the interconnection of islands of FC storage area networks (SANs) over IP-based networks to form a unified SAN in a single FC fabric. The FCIP instance becomes a binding point for the association of other configuration parameters.

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2 Storage Router. Each FCIP instance requires one and only one peer.

There can be a maximum of 2 FCIP instances defined per storage router. Each FCIP instance is associated with:

- An internal FC interface *fci1* or *fci2* (fci1 is initiator WWPN1 and fci2 is initiator WWPN2). The FCIP instance named *fcip1* is associated with fci1; the instance named *fcip2* is associated with fci2. This association is made automatically.
- A network interface, which provides IP connectivity to the peer destination. The FCIP instance named *fcip1* uses the Gigabit Ethernet interface, *ge1*; the instance named *fcip2* uses *ge2*. If both Gigabit Ethernet interfaces are cabled to the same network, you can configure the FCIP instance to failover to the secondary interface in case of a failure on the primary interface.
- A destination, which is the IP address of the FCIP instance on the peer SN 5428-2 Storage Router. The destination configuration includes the connection protocol (TCP/IP or raw IP) used between the FCIP instances.

This command updates the running configuration of the storage router. You must save the FCIP instance configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Issue the **save fcip** command with the **bootconfig** keyword to save the FCIP instance to the storage router bootable configuration.

Examples

The following example creates an FCIP instance named *fcip1*:

```
[SN5428-2A]# fcip fcip1
```

Related Commands

Command	Description
clear counters fcip	Reset accumulated operational statistics for the specified SCSI routing instance.
delete fcip	Delete the named FCIP instance or the specified element of the FCIP instance.
delete fcip	Enable debugging for the named FCIP instance.
fcip description	Add user-defined identification information to the named FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
fcip destination raw	Add a peer destination to the named FCIP instance, with a connection type of raw IP.
fcip destination tcpclient	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance initiates the TCP connection.
fcip destination tcpserver	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance listens for the TCP connection from the named destination.
fcip enable	Stop or start the named FCIP instance.
fcip networkif	Assign a Gigabit Ethernet interface and IP address to the named FCIP instance.
restore fcip	Restore the named SCSI routing instance from the named configuration file.
save fcip	Save configuration information for the named FCIP instance.
show debug fcip	Display debugging information for the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

fcip description

To add user-defined identification information to the named FCIP instance, use the **fcip description** command.

fcip *name* **description** *"user text"*

Syntax Description

name	The name of this FCIP instance. Valid named are *fcip1* and *fcip2*.
"user text"	User-defined identification information associated with this FCIP instance. If the string contains spaces, enclose it in quotes. Enter a maximum of 64 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

This command allows you to add a new description or change an existing description. Descriptions are site-specific.

Examples

The following example adds the description "*Access to lab SAN island 7*" to the FCIP instance *fcip1*:

```
[SN5428-2A]# fcip fcip2 description "Access to lab SAN island 7"
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
save fcip	Display configuration and operational information for the named FCIP instance.

fcip destination config

To configure operational parameters for the selected FCIP connection protocol type, use the **fcip destination config** command.

fcip *name* **destination** *name* **config {rxtcpwinsize | txtcpwinsize}** *nn*

fcip *name* **destination** *name* **config tcpport** *port-number*

fcip *name* **destination** *name* **config {bcouthiwater | burstouthiwater}** *nn*

fcip *name* **destination** *name* **config frouthiwater** *nn*

fcip *name* **destination** *name* **config peerneedsackhiwater** *nn*

fcip *name* **destination** *name* **config {initialtimeout | maxtimeout | totaltimeout}** *nn*

fcip *name* **destination** *name* **config ipprotocol** *nn*

fcip *name* **destination** *name* **config rexmitcount** *nn*

fcip *name* **destination** *name* **config timeoutincrement** *nn*

fcip *name* **destination** *name* **config frinhiwater** *nn*

fcip *name* **destination** *name* **config idlepingdelay** *nn*

fcip *name* **destination** *name* **config pkttracemask** *mask*

fcip *name* **destination** *name* **config usebport {yes | no}**

Syntax Description

name	The name of this FCIP instance. Valid named are *fcip1* and *fcip2*.
destination *name*	The name of the peer destination.
rxtcpwinsize *nn*	The maximum number of outstanding bytes that can be received on a TCP connection. Valid values are 8192 to 2097152, inclusive. The default value is 262144. This configuration option applies to TCP client or TCP server connections only.
txtcpwinsize *nn*	The maximum number of outstanding bytes that can be transmitted on a TCP connection. Valid values are 8192 to 2097152, inclusive. The default value is 2097152. This configuration option applies to TCP client or TCP server connections only.
tcpport *port-number*	The TCP port number. The TCP server listens to this port; the TCP client connects to this port. Valid values are 0 to 65535, inclusive. The default port is 3225. This configuration option applies to TCP client or TCP server connections only.
bcouthiwater *nn*	The maximum number of bytes that can be outstanding on a raw IP connection. Valid values are from 1 to 4294967294, inclusive. The default value is 2097152. This configuration option applies to raw IP connections only.

burstouthiwater *nn*	The maximum number of bytes that can be transmitted on a raw IP connection. Valid values are from 1 to 4294967294, inclusive. The default value is 2097152. This configuration option applies to raw IP connections only.
frouthiwater *nn*	The maximum number of frames that can be outstanding on a raw IP connection. Valid values are from 1 to 4294967294, inclusive. The default value is 1024. This configuration option applies to raw IP connections only.
peerneedsackhiwater *nn*	The maximum number of unacknowledged frames that can exist at any given time on a raw IP connection. Valid values are from 0 to 4294967294. The default value is 16. This configuration option applies to raw IP connections only.
initialtimeout *nn*	The initial amount of time, in ticks, to delay before retransmitting a packet. This value is used in error recovery algorithms. Valid values are from 0 to 2147483647. The default value is 0. This configuration option applies to raw IP connections only.
maxtimeout *nn*	The maximum amount of time, in ticks, that can be used for any one retransmission, before the packet is discarded. This value is used in error recovery algorithms. Valid values are from 0 to 2147483647. The default value is 48 ticks. This configuration option applies to raw IP connections only. **Note** The default value is set to 48 ticks only if **timeoutincrement**, **initialtimeout** and **totaltimeout** keywords have no associated value.
totaltimeout *nn*	The maximum amount of time, in ticks, that a packet is kept alive, before it is discarded. This value is used in error recovery algorithms. Valid values are from 0 to 2147483647. The default value is 0. This configuration option applies to raw IP connections only.
ipprotocol *nn*	The value of the IP protocol used in the IP header. Valid values are from 0 to 255. The default value is 4. This configuration option applies to raw IP connections only. **Note** This should be a unique IP protocol value. Do not change this value to an IP protocol that is currently in use on the storage router. For example, do not change the value to the TCP protocol (6) or UDP protocol (17).
rexmitcount *nn*	The maximum number of times a packet can be retransmitted, before it is discarded. This value is used in error recovery algorithms. Valid values are from 1 to 2147483647. The default value is 4. This configuration option applies to raw IP connections only.
timeoutincrement *nn*	The amount of time, in ticks, to add to a packet's time out value before retransmitting the packet. This value increases the delay before the next retransmission, and is used in error recovery algorithms. Valid values are from 0 to 2147483647. The default value is 0. This configuration option applies to raw IP connections only.
frinhiwater *nn*	The maximum number of frames, received from a raw IP connection, that can be sent to the Fibre Channel (FC) interface. Valid values are from 1 to 4294967294. The default value is 688. This configuration option applies to all FCIP connection types.

idlepingdelay *nn*	The number of seconds before a keep-alive packet is sent across an idle connection. Valid values are 1 to 65535, inclusive. The default value is 60. This configuration option applies to all FCIP connection types.
pkttracemask *mask*	The value of the packet trace mask, in hex. Packets are traced for debugging problems. Valid values are 0 (0x0000) to 0xffff. A value of zero disables packet tracing. The default value is 0xffff, which enables all packet tracing. This configuration option applies to all FCIP connection types.
usebport yes	Use Fibre Channel (FC) B_Port connectivity. This configuration option applies to all FCIP connection types. This is the default.
usebport no	Do not use FC B_Port connectivity. This value should only be set if the SN 5428-2 is connected to another FCIP device that does not support B_Port connectivity.

Defaults

The following are the default settings for all FCIP connection configuration options:

- TCP receive window size—262144 bytes
- TCP transmit window size—2097152 bytes
- TCP port number—3225
- Maximum number of bytes outstanding on raw IP connection—2097152 bytes
- Maximum number of bytes transmitted on raw IP connection—2097152 bytes
- Maximum number of frames sent to FC interface—688 frames
- Maximum number of frames outstanding—1024 frames
- Maximum number of unacknowledged frames—16 frames
- Initial amount of delay before retransmission—0 ticks
- Maximum amount of time for retransmission—48 ticks
- Maximum amount of time a packet can be kept alive—0 ticks
- Value of IP protocol in IP header—4
- Maximum number of retransmissions—4
- The amount of time to increase the delay prior to retransmission—0 ticks
- The amount of time before a keep-alive ping is sent across an idle connection—60 seconds
- Packet trace mask—0xffff (packet tracing is enabled for all packets)
- The FCIP instance uses FC B_Port connectivity.

The default error recovery algorithm for raw connection protocol uses **maxtimeout** and **rexmitcount** values (timeout = **maxtimeout / rexmitcount**--).

Note One second is approximately 60 ticks.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

Each FCIP instance requires three active elements:

- The *networkif* element assigns an interface and IP address for use by the FCIP peer.
- The *destination* element assigns the peer's protocol and IP address.
- The device interface element associates the FCIP instance with an internal Fibre Channel interface and is automatically assigned and enabled.

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2 Storage Router. Each FCIP instance requires one and only one peer. Both FCIP instances must be configured to use the same connection protocol, TCP/IP or raw IP.

TCP/IP connection protocol uses the FCIP standard and TCP flow control and error recovery algorithms. FCIP, using TCP connections, allows you to configure TCP receive and transmit window sizes. Raw IP uses a proprietary protocol, but allows you to configure a wider variety of operational settings, providing more granular control over flow control and error recovery. All changes to raw IP operational parameters are applied immediately. Changes to TCP operational parameters are not applied until the FCIP instance is stopped and restarted, or the storage router is rebooted.

Raw IP connections have unique flow control settings for network transmissions and FC transmissions. The FC transmission counter (the **frinhiwater** keyword) limits the number of frames given to the FC interface for transmission. The FC frames are only acknowledged once they have been transmitted out of the SN 5428-2. The network transmissions are controlled by both a byte counter (the **burstouthiwater** keyword) and a frame counter (the **frouthiwater** keyword). FCIP will not transmit data when either counter has reached its high water mark. The data is queued until the counters have receded from their high water mark.

Raw IP uses four error recovery algorithms. These algorithms use five different operational settings, which control which error recovery algorithm is used.

- **rexmitcount**—The maximum number of times a packet can be retransmitted, before it is discarded.
- **maxtimeout**—The maximum amount of time, in ticks, that can be used for any one retransmission, before the packet is discarded.
- **timeoutincrement**—The amount of time, in ticks, to add to a packet's time out value before retransmitting the packet.
- **initialtimeout**—The initial amount of time, in ticks, to delay before retransmitting a packet.
- **totaltimeout**—The maximum amount of time, in ticks, that a packet is kept alive, before it is discarded.

The following are the available error recovery algorithms:

1. For error recovery using **maxtimeout** and **rexmitcount**:
   - timeout = **maxtimeout / rexmitcount**--

   For example, using a **maxtimeout** value of 48 and **rexmitcount** value of 4 would result in retransmissions at 12, 16, 24 and 48 ticks. This is the default error recovery algorithm.
2. For error recovery using **timeoutincrement** and **rexmitcount**:
   - timeout += **timeoutincrement**

   For example, using a **timeoutincrement** value of 8 and a **rexmitcount** value of 4 would result in retransmissions at 8, 16, 24 and 32 ticks.

3. For error recovery using **timeoutincrement**, **initialtimeout** and **rexmitcount**:
   - timeout = **initialtimeout** /* initial calculation */
   - timeout = timeout * **timeoutincrement** /* subsequent calculations */

   For example, using a **timeoutincrement** value of 2, an **initialtimeout** value of 8, and a **rexmitcount** of 4 would result in retransmissions at 8, 16, 32 and 64 ticks.
4. For error recovery using **totaltimeout** and **rexmitcount**:
   - if (**rexmitcount** & 0x01) timeout = ((**rexmitcount**-remainingrexmitcount+1)*__totaltimeout__) / (**rexmitcount***((**rexmitcount**/2)+(**rexmitcount**/2))
   - else timeout = ((**rexmitcount**-remaining rexmitcount+1)*__totaltimeout__) / (**rexmitcount***((**rexmitcount***((**rexmitcount**/2)+(**rexmitcount**/2))

   For example, using a totaltimeout value of 48 and a rexmitcount value of 4 would result in retransmissions at 4, 9, 14 and 17 ticks.

By default, a raw IP connection uses the first error recovery algorithm. To use another error recovery algorithm, set the desired values for the appropriate operational settings. For example, to use the second error recovery algorithm, set the **timeoutincrement** and, optionally, the **rexmitcount**. To use the fourth error recovery algorithm, set the **totaltimeout** and, optionally, the **rexmitcount**.

Examples

The following example add the destination *dest1* to the FCIP instance named *fcip1*. The destination IP address is *10.1.40.27*. The FCIP instance is configured to use TCP/IP connection protocol and will initiate the connection (TCP client). The destinations TCP receive window size is set to 1 MB.

```
[SN5428-2A]# fcip fcip1 destination dest1 tcpclient 10.1.40.27
*[SN5428-2A]# fcip fcip1 destination dest1 config rxtcpwinsize 1048576
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip destination raw	Add a peer destination to the named FCIP instance, with a connection type of raw IP.
fcip destination tcpclient	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance initiates the TCP connection.
fcip destination tcpserver	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance listens for the TCP connection from the named destination.
fcip networkif	Assign a Gigabit Ethernet interface and IP address to the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

fcip destination raw

To add a peer destination to the named FCIP instance, with a connection type of raw IP, use the **fcip destination raw** command.

fcip *name* **destination** *name* **raw** *A.B.C.D*

Syntax Description

name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.
destination *name*	The name of the peer destination. Enter a maximum of 31 characters.
A.B.C.D	The IP address of the peer destination. *A.B.C.D* is the dotted quad notation of the IP address. The peer destination is the FCIP instance running in the partner SN 5428-2 Storage Router.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

Each FCIP instance requires three active elements:

- The *networkif* element assigns an interface and IP address for use by the FCIP peer.
- The *destination* element assigns the peer's protocol and IP address.
- The device interface element associates the FCIP instance with an internal Fibre Channel interface and is automatically assigned and enabled.

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2 Storage Router. Each FCIP instance requires one and only one peer. Use this command to configure a peer destination name and IP address, using raw IP as the protocol type.

The destination IP address is the Gigabit Ethernet IP address of the FCIP instance running in the peer SN 5428-2 Storage Router. Both FCIP instances must be configured to use the same connection protocol.

Raw IP uses a proprietary connection protocol, but provides more operational control over flow control and error recovery than standard TCP/IP.

Note When configuring an FCIP instance, you must configure the network interface before you configure the peer destination and protocol.

Examples

The following example configures the FCIP instance named *fcip1* with a destination named *lucky* at IP address *10.1.3.47*, using raw IP connection protocol:

```
[SN5428-2A]# fcip fcip1 destination lucky raw 10.1.3.47
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
fcip networkif	Assign a Gigabit Ethernet interface and IP address to the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

fcip destination tcpclient

To add a peer destination to the named FCIP instance, with a connection type of TCP/IP, use the **fcip destination tcpclient** command. The named FCIP instance will initiate the TCP connection.

fcip *name* **destination** *name* **tcpclient** *A.B.C.D*

Syntax Description

name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.
destination *name*	The name of the peer destination. Enter a maximum of 31 characters.
A.B.C.D	The IP address of the peer destination. *A.B.C.D* is the dotted quad notation of the IP address. The peer destination is the FCIP instance running in the partner SN 5428-2 Storage Router.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

Each FCIP instance requires three active elements:

- The *networkif* element assigns an interface and IP address for use by the FCIP peer.
- The *destination* element assigns the peer's protocol and IP address.
- The device interface element associates the FCIP instance with an internal Fibre Channel interface and is automatically assigned and enabled.

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2 Storage Router. Each FCIP instance requires one and only one peer.

Use this command to configure a peer destination name and IP address, using TCP/IP as the protocol type. When configured as a TCP client, the FCIP instance initiates the connection to the peer destination. The peer destination must be configured as a TCP server. The TCP server listens for the initial connection.

Note The only functional difference between an FCIP instance configured as a TCP client and an FCIP instance configured as a TCP server is during the initial connection, which is initiated by the TCP client.

The destination IP address is the Gigabit Ethernet IP address of the FCIP instance running in the peer SN 5428-2 Storage Router.

TCP/IP connection protocol uses the FCIP standard and TCP flow control and error recovery algorithms. FCIP, using TCP connections, allows you to configure TCP receive and transmit window sizes.

Note When configuring an FCIP instance, you must configure the network interface before you configure the peer destination and protocol.

Examples

The following example configures the FCIP instance named *fcip2* with a destination named *lucky2* at IP address *10.1.4.32*, using TCP/IP connection protocol. The FCIP instance is configured as a TCP client, and will initiate the TCP connection to the destination.

```
[SN5428-2A]# fcip fcip2 destination lucky2 tcpclient 10.1.4.32
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
fcip networkif	Assign a Gigabit Ethernet interface and IP address to the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

fcip destination tcpserver

To add a peer destination to the named FCIP instance, with a connection type of TCP/IP, use the **fcip destination tcpserver** command. The named FCIP instance will listen for the TCP connection from the named destination.

fcip *name* **destination** *name* **tcpserver** *A.B.C.D*

Syntax Description

name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.
destination *name*	The name of the peer destination. Enter a maximum of 31 characters.
A.B.C.D	The IP address of the peer destination. *A.B.C.D* is the dotted quad notation of the IP address. The peer destination is the FCIP instance running in the partner SN 5428-2 Storage Router.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

Each FCIP instance requires three active elements:

- The *networkif* element assigns an interface and IP address for use by the FCIP peer.
- The *destination* element assigns the peer's protocol and IP address.
- The device interface element associates the FCIP instance with an internal Fibre Channel interface and is automatically assigned and enabled.

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2 Storage Router. Each FCIP instance requires one and only one peer.

Use this command to configure a peer destination name and IP address, using TCP/IP as the protocol type. When configured as a TCP server, the FCIP instance listens for the connection from the peer destination. The peer destination must be configured as a TCP client. The TCP client initiates the TCP initial TCP connection.

Note The only functional difference between an FCIP instance configured as a TCP client and an FCIP instance configured as a TCP server is during the initial connection, which is initiated by the TCP client.

The destination IP address is the Gigabit Ethernet IP address of the FCIP instance running in the peer SN 5428-2 Storage Router.

TCP/IP connection protocol uses the FCIP standard and TCP flow control and error recovery algorithms. FCIP, using TCP connections, allows you to configure TCP receive and transmit window sizes.

Note When configuring an FCIP instance, you must configure the network interface before you configure the peer destination and protocol.

Examples

The following example configures the FCIP instance named *fcip1* with a destination named *dest1* at IP address *10.1.5.222*, using TCP/IP connection protocol. The FCIP instance is configured as a TCP server, and will listen for the TCP connection from the destination.

```
[SN5428-2A]# fcip fcip1 destination dest1 tcpserver 10.1.5.222
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
fcip networkif	Assign a Gigabit Ethernet interface and IP address to the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

fcip enable

To start the named FCIP instance on this SN 5428-2 Storage Router, use the **fcip enable** command. To stop the named FCIP instance, use the **no** form of this command.

fcip {*name* **| all} enable**

no fcip {*name* **| all} enable**

Syntax Description

name	The name of the FCIP instance to be started. Valid names are *fcip1* and *fcip2*.
all	Start all FCIP instances on this storage router.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

FCIP instances are automatically started by the storage router during the creation process and when the storage router is restarted. Use this command to manually control the running state of FCIP instances.

Use the **all** keyword to start all FCIP instances on the SN 5428-2. All instances previously stopped on this storage router will be restarted. This form of the command is always available; the only time the command is available for a named FCIP instance is when that FCIP instance has been previously stopped.

Examples

The following example starts the FCIP instance named *fcip2*. This instance must have been previously stopped.

```
[SN5428-2A]# fcip fcip2 enable
```

The following example stops all FCIP instances running on the storage router:

```
[SN5428-2A]# no fcip all enable
```

Related Commands

Command	Description
delete fcip	Delete the named FCIP instance or the specified element of the FCIP instance.
fcip	Create an FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

fcip networkif

To assign a Gigabit Ethernet interface and IP address to the named FCIP instance, use the **fcip networkif** command. The specified interface provides IP connectivity between the FCIP instance and its peer destination.

fcip *name* **networkif** {*A.B.C.D/bits* | *A.B.C.D/1.2.3.4*} **[secondary]**

Syntax Description

name	Name of the FCIP instance to which you are adding the Gigabit Ethernet interface. Valid names are *fcip1* and *fcip2*.
A.B.C.D/bits	The IP address of the named interface. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style. **Note** For the FCIP instance named *fcip1*, the IP address must be accessible from the Gigabit Ethernet interface, *ge1*. For the instance named *fcip2*, the IP address must be accessible from the interface *ge2*.
A.B.C.D/1.2.3.4	The IP address of the named interface. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.
secondary	(Optional) Indicates the specified IP address is available from both Gigabit Ethernet interfaces. If the primary interface goes down and remains down for two seconds, the specified IP address will be moved to the secondary interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

The specified interface IP address is configured as the destination IP address for the FCIP instance running in the peer SN 5428-2 Storage Router.

Each FCIP instance requires three active elements:

- The *networkif* element assigns an interface and IP address for use by the FCIP peer.
- The *destination* element assigns the peer's protocol and IP address.
- The device interface element associates the FCIP instance with an internal Fibre Channel interface and is automatically assigned and enabled.

An FCIP instance runs with a point-to-point connection to an FCIP instance on a peer SN 5428-2 Storage Router. Each FCIP instance requires one and only one peer.

Note Each FCIP instance must connect to a unique peer SN 5428-2 Storage Router. If you have two FCIP instances running in a single storage router, you cannot connect both instances to the same peer SN 5428-2 Storage Router.

Use this command to configure an IP address for the FCIP instance, to be used by the FCIP peer for IP connectivity. For the FCIP instance named *fcip1*, the IP address is automatically associated with the Gigabit Ethernet interface, *ge1*. For the FCIP instance named *fcip2*, the IP address is automatically associated with the Gigabit Ethernet interface, *ge2*.

When configuring an FCIP instance, you must configure the network interface before you configure the peer destination and protocol.

If the **secondary** keyword is used, both Gigabit Ethernet interfaces must be connected to the same network segment. If the primary interface goes down and remains down for two seconds, the IP address will be moved to the secondary interface.

Note If you configure a Gigabit Ethernet IP address with a secondary interface, all Gigabit Ethernet IP addresses on the same subnet must also be configured with the same secondary interface.

You can configure two FCIP instances on a single storage router to use the same network interface. You must fully configure one FCIP instance, and then configure a second FCIP instance without configuring a network interface. The second FCIP instance will use the same network interface as configured for the first instance. The two FCIP instances should use different connection protocols, or if both are configured as TCP servers, each FCIP instance must use a unique TCP port number.

Examples

The following command adds the IP address 10.1.10.128/24, to the FCIP instance named *fcip2*. This IP address will automatically be associated with the Gigabit Ethernet interface, *ge2*.

```
[SN5428-2A]# fcip fcip2 networkif 10.1.10.128/24
```

The following command adds the IP address 10.1.30.128, with a netmask of 255.255.255.0, to the FCIP instance *fcip1*. This IP address is automatically associated with the Gigabit Ethernet interface, *ge1*. If the primary interface is not available, the IP address will be moved to the secondary Gigabit Ethernet interface, *ge2*. The Gigabit Ethernet interfaces must be connected to the same network.

```
[SN5428-2A]# fcip fcip1 networkif 10.1.30.128/255.255.255.0 secondary
```

The following set of commands configures the FCIP instance named *fcip1*, adds the network IP address 10.1.40.42/24, and configures the destination, *dest1*, with a TCP client connection type. The second FCIP instance, *fcip2*, is configured with a destination named *dest2* and a TCP server connection type. Both FCIP instances will use the 10.1.40.42/24 network interface.

```
[SN5428-2A]#fcip fcip1
*[SN5428-2A] fcip fcip1 networkif 10.1.40.42/24
*[SN5428-2A] fcip fcip1 destination dest1 tcpclient 10.1.1.144
*[SN5428-2A] fcip fcip2
*[SN5428-2A] fcip fcip2 destination dest2 tcpserver 10.1.5.73
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
fcip destination raw	Add a peer destination to the named FCIP instance, with a connection type of raw IP.
fcip destination tcpclient	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance initiates the TCP connection.
fcip destination tcpserver	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance listens for the TCP connection from the named destination.
show fcip	Display configuration and operational information for the named FCIP instance.

fcswitch beacon enable

To enable all Fibre Channel port Logged-In (LOG) LEDs to flash, use the **fcswitch beacon enable** command. To disable LOG LED flashing, use the **no** form of this command.

fcswitch beacon enable

no fcswitch beacon enable

Syntax Description

This command has no arguments or keywords.

Defaults

Beacon flashing is disabled, by default. See the *SN 5428-2 Storage Router Hardware Installation Guide* for default LOG LED indication descriptions.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to assist in locating a physical unit. This command is primarily used for troubleshooting purposes.

Examples

The following example causes all Fibre Channel port LOG LEDs on the storage router to flash:

```
[SN5428-2A]# fcswitch beacon enable
```

Related Commands

Command	Description
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch devlog

To specify the logging parameters for the SN 5428-2 Storage Router integrated Fibre Channel (FC) switch component development log file, use the **fcswitch devlog** command.

fcswitch devlog components *component1 [component2...]*

fcswitch devlog level *notification-level*

Syntax Description

components *component1 [component2...]*	At least one of the components described in Table 12-6.
level *notification-level*	Limit logging to messages of a specified level or lower. See Table 12-7 in the Usage Guidelines section for a list of valid names that can be used for the *notification-level* argument.

Defaults

No components or notification level are configured. Development logging for the SN 5428-2 Storage Router integrated FC switch component is disabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **fcswitch devlog** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

After logging is enabled, use this command to limit the amount of information recorded in the switch development log by component and by notification level. To stop all logging for all components, set the notification level to **none**. Use the **fcswitch devlog enable** command to enable development logging.

Table 12-6 fcswitch devlog components

Component	Description
Cmon	Monitors internal chassis components and applications.
Diag	Handles online testing and other diagnostic tasks.
Ds	Data services repository for all switch data.
Fc2	Class 2 frame handler.
MgmtApp	Manages the user interface and internal configuration for the switch.
PortApp	Manages the switch ports.

Table 12-6 fcswitch devlog components (continued)

Component	Description
Swb	Software bus internal process communications mechanism.
Util	Utility message interpreter for handling legacy user interfaces.

Table 12-7 fcswitch devlog notification-level

Notification Level	Description
Critical	Log all messages from the selected components (critical, warning and informational).
Warn	Log all warning and informational messages for the selected components.
Info	Log informational messages only for the selected components.
None	Log no messages. This setting stops switch development logging.

Examples

The following example limits the switch development log file to informational messages only from the management application and the class 2 frame handler:

```
[SN5428-2A]# fcswitch devlog components MgmtApp Fc2
[SN5428-2A]# fcswitch devlog level info
```

The following example stops all switch devlog logging:

```
[SN5428-2A]# fcswitch devlog level none
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch devlog enable	Enable development logging for the integrated FC switch component.
fcswitch log interface	Restrict the integrated FC switch logging to information related to a specific FC interface.
show debug fcswitch	Display internal FC interface parameters, including switch log entries.

fcswitch devlog enable

To start development logging for the SN 5428-2 Storage Router integrated Fibre Channel (FC) switch component, use the **fcswitch devlog enable** command. To stop development logging, use the **no** form of this command.

fcswitch devlog enable

no fcswitch devlog enable

Syntax Description

This command has no arguments or keywords.

Defaults

Development logging is stopped.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **fcswitch devlog enable** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example starts development logging for the FC switch component and limits the switch development log file to informational messages only from the management application and the class 2 frame handler:

```
[SN5428-2A]# fcswitch devlog components MgmtApp Fc2
[SN5428-2A]# fcswitch devlog level info
[SN5428-2A]# fcswitch devlog enable
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch devlog	Specify logging parameters for the switch development log file.
fcswitch log interface	Restrict the integrated FC switch logging to information related to a specific FC interface.
show debug fcswitch	Display internal FC interface parameters, including switch log entries.

fcswitch diag

To set all Fibre Channel (FC) interfaces into diagnostic mode for testing purposes, use the **fcswitch diag** command.

fcswitch diag

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to change all FC interfaces to diagnostic mode prior to performing internal or external loopback testing on individual FC interfaces.

- Use the **fcswitch enable** command to reenable all FC interfaces. An FC interface must be enabled to run online loopback tests or to allow access to storage targets.
- Use the **no fcswitch enable** command to disable all FC interfaces. When you are ready to allow access to the storage targets, you can enable all FC interfaces at once via the **fcswitch enable** command, or enable individual interfaces via the **interface fc? enable** command.

Examples

The following example sets all FC interfaces into a diagnostic state and then performs an internal loopback test on the FC interface named *fc6*:

```
[SN5428-2A]# fcswitch diag
[SN5428-2A]# interface fc6 loopback internal
```

Related Commands

Command	Description
fcswitch enable	Enable all FC interfaces.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch domainid

To set the SN 5428-2 Storage Router's domain ID for switched zoned fabric to a unique value, and to prevent the FC fabric from changing that domain ID, use the **fcswitch domainid** command. To disable the lock and allow the domain ID to be changed by the switched zoned fabric, use the **no** form of this command.

fcswitch domainid {*domain-id*} **[force]**

fcswitch domainid lock enable

no fcswitch domainid lock enable

Syntax Description

domain-id	The domain identification number associated with the storage router.
force	(Optional) Suppress warning prompts and messages.
lock enable	Keywords used to disallow changes to the domain ID from the switched zoned fabric.

Defaults

The default domain ID for fabric zoning is 1. The domain ID can be changed by the switched zoned fabric, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to set the SN 5428-2 Storage Router's domain identification number for switched zoned fabric to a unique value or to prevent changes to that value by the zoned fabric. Domain IDs allow fabrics to be segmented into different areas.

Domain IDs must be unique among all switch elements within a fabric. If there is a domain ID conflict, the expansion ports (ports operating as E_Ports) on the two conflicting elements are disabled, isolating the Interswitch Link (ISL).

If you are planning to connect to a switched zoned fabric via one or more FC interfaces, complete the appropriate zoning configuration for the storage router, as described in Chapter 5, "Configuring Fibre Channel Interfaces."

Note Changing the domain ID in an operational fabric may cause traffic disruption. All ports operating as E_Ports should be inactive or disabled prior to changing the domain ID.

Examples

The following example sets the switched zoned fabric domain ID for the storage router to 42:

```
[SN5428-2A]# fcswitch domainid 42
*** Warning: Changing domain ID in an operational fabric will cause traffic disruption
  Do you want to continue? [(yes/no (no)] yes
```

The following example sets the switched zoned fabric domain ID for the storage router to 5 and enables the lock, which prevents the domain ID from being changed by the zoned fabric.

```
[SN5428-2A]# fcswitch domainid 5
*** Warning: Changing domain ID in an operational fabric will cause traffic disruption
  Do you want to continue? [(yes/no (no)] yes
[SN5428-2A]# fcswitch domainid lock enable
```

Related Commands

Command	Description
fcswitch enable	Enable all FC interfaces.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch zoning autosave	Configure the storage router to participate in FC switched zones.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.

fcswitch dstov

To specify the amount of time the storage router is to wait for Fibre Channel (FC) Distributed Services, use the **fcswitch dstov** command.

fcswitch dstov {*nn* | **default**}

Syntax Description

nn	The Distributed Services timeout value, in milliseconds.
default	Keyword, indicating the storage router is to wait 5000 milliseconds for Fibre Channel Distributed Services.

Defaults

The default Distributed Services timeout value is 5000 milliseconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to specify the length of time the storage router should wait for FC Distributed Services, such as the Management Server or Name Server, before returning an error.

Use the **default** keyword to return the Distributed Services timeout value to 5000 milliseconds.

Examples

The following example sets the Distributed Services timeout value to 7500 milliseconds:

```
[SN5428-2A]# fcswitch dstov 7500
```

The following example resets the Distributed Services timeout value to the default of 5000 milliseconds:

```
[SN5428-2A]# fcswitch dstov default
```

Related Commands

Command	Description
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch edtov

To specify an error detect timeout value for all Fibre Channel (FC) interfaces, use the **fcswitch edtov** command.

fcswitch edtov {*nn* **| default}**

Syntax Description

nn	The amount of time a port is to wait for errors to clear, in milliseconds.
default	Keyword, indicating the port is to wait 2000 milliseconds for errors to clear.

Defaults

The default error detect timeout value is 2000 milliseconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The error detect timeout value is the amount of time the FC port is to wait for all errors to clear. This value applies to all FC interfaces in the storage router.

Error detect timeout values should be the same for all SN 5428-2 Storage Routers or switches in the fabric.

Examples

The following example sets the error detect timeout value to 4000 milliseconds:

```
[SN5428-2A]# fcswitch edtov 4000
```

The following example resets the error detect timeout value to the default of 2000 milliseconds:

```
[SN5428-2A]# fcswitch edtov default
```

Related Commands

Command	Description
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch enable

To enable all Fibre Channel (FC) interfaces, use the **fcswitch enable** command. To disable all FC interfaces, use the **no** form of this command.

fcswitch enable

no fcswitch enable

Syntax Description

This command has no arguments or keywords.

Defaults

All FC interfaces are enabled, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An FC interface must be enabled to allow access to storage targets or perform online loopback testing. Use this command to enable all FC interfaces at one time.

If you experience problems with FC storage, use the **no** form of this command to quickly disable all FC interfaces at once.

Examples

The following example enables all FC interfaces and then performs an online loopback test for the FC interface named *fc6*:

```
[SN5428-2A]# fcswitch enable
[SN5428-2A]# interface fc6 loopback online
```

The following example disables all FC interfaces.

```
[SN5428-2A]# no fcswitch enable
```

Related Commands

Command	Description
fcswitch diag	Set all FC interfaces into diagnostic mode for testing purposes.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.

fcswitch fstov

To specify the fabric services timeout value, use the **fcswitch fstov** command.

fcswitch fstov {*nn* | **default**}

Syntax Description

nn	The amount of time the storage router is to wait for fabric services, in milliseconds.
default	Keyword, indicating the storage router will wait for 1000 milliseconds for fabric services.

Defaults

The default fabric stability timeout value is 1000 milliseconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to specify the number of milliseconds the storage router will wait for fabric services.

Examples

The following example sets the fabric services timeout value to 5000 milliseconds:

```
[SN5428-2A]# fcswitch fstov 5000
```

The following example resets the fabric services timeout value to the default of 1000 milliseconds:

```
[SN5428-2A]# fcswitch fstov default
```

Related Commands

Command	Description
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch interop-credit

To set the buffer-to-buffer credit value for all Fibre Channel (FC) ports, use the **fcswitch interop-credit** command.

fcswitch interop-credit *credit*

Syntax Description

credit	The data buffer credit capacity, also known as the buffer-to-buffer credit value. The *credit* variable is an integer between 0 and 255 inclusive. The default value is 12.

Defaults

The data buffer credit capacity is 12, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to set the data buffer credit capacity for all the storage router FC ports. The port buffer credit is used to determine how many maximum sized frames can be sent to a recipient before the sending port must wait for an acknowledgement. When the acknowledgement is received, the sending port can continue by sending the next frame. Port buffer credits are required when buffer-to-buffer flow control is in use. Buffer-to-buffer flow control occurs between directly connected FC ports.

The data buffer credit capacity must be the same for all switches across the fabric, and should be set to the lowest system-wide setting.

Examples

The following example sets the data buffer credit capacity to 15:

```
[SN5428-2A]# fcswitch interop-credit 15
```

Related Commands

Command	Description
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch enable	Enable all FC interfaces.
fcswitch zoning autosave	Configure the storage router to participate in FC switched zones.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch log interface

To restrict the SN 5428-2 Storage Router integrated Fibre Channel (FC) switch logging to information related to a specific FC interface, use the **fcswitch log interface** command.

fcswitch log interface {*if-name* **| default}**

Syntax Description

if-name	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
default	Enable logging for all FC interfaces.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **fcswitch log interface** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example restricts logging for the integrated FC switch to information associated with *fc3*:

```
[SN5428-2A]# fcswitch log interface fc3
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch devlog	Specify logging parameters for the switch development log file.
fcswitch devlog enable	Enable development logging for the integrated FC switch component
fcswitch syslog	Specify logging parameters for the switch system log file.
fcswitch syslog enable	Enable system logging for the integrated FC switch component.
show debug fcswitch	Display internal FC interface parameters, including switch log entries.

fcswitch ratov

To specify a Fibre Channel (FC) resource allocation timeout value for the storage router, use the **fcswitch ratov** command.

fcswitch ratov {*nn* | **default**}

Syntax Description

nn	The amount of time the storage router is to wait to allow two FC ports to allocate enough resources to establish a link.
default	Keyword, indicating the storage router is to wait up to 10000 milliseconds to allow two FC ports to allocate enough resources to establish a link.

Defaults

The default resource allocation timeout value is 10000 milliseconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The resource allocation timeout value is the amount of time the storage router is to wait to allow two FC ports to allocate sufficient resources to establish a link.

Resource allocation timeout values should be the same for all SN 5428-2 Storage Routers or switches in the fabric.

Examples

The following example sets the resource allocation timeout value to 9000 milliseconds:

```
[SN5428-2A]# fcswitch ratov 9000
```

The following example resets the resource allocation timeout value to the default of 10000 milliseconds:

```
[SN5428-2A]# fcswitch ratov default
```

Related Commands

Command	Description
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
show fcswitch	Display global configuration information for storage router FC interfaces.

fcswitch syslog

To specify the logging parameters for the SN 5428-2 Storage Router integrated Fibre Channel (FC) switch component system log file, use the **fcswitch syslog** command.

fcswitch syslog components *component1 [component2...]*

fcswitch syslog level *notification-level*

Syntax Description

components *component1 [component2...]*	At least one of the components described in Table 12-8.
level *notification-level*	Limit logging to messages of a specified level or lower. See Table 12-9 in the Usage Guidelines section for a list of valid names that can be used for the *notification-level* argument.

Defaults

All components log information into the SN 5428-2 Storage Router integrated FC switch component system log, by default. The default notification level is *critical*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to limit the amount of information recorded in the switch system log by component and by notification level. To stop all logging for all components, set the notification level to **none**.

Table 12-8 fcswitch syslog components

Component	Description
Blade	Monitors modular circuit boards.
Chassis	Monitors chassis hardware components.
Eport	Monitors all Fibre Channel interfaces where the port is operating as an expansion port (E_Port).
NameServer	Monitors name server events.
MgmtServer	Monitors management server status.
Other	Monitors miscellaneous events.
Port	Monitors all port events.
Switch	Monitors switch management events.
Zoning	Monitors zoning conflict events.

Table 12-9 fcswitch syslog notification level

Notification Level	Description
Critical	Log all messages from the selected components (critical, warning and informational).
Warn	Log all warning and informational messages for the selected components.
Info	Log informational messages only for the selected components.
None	Log no messages. This setting stops switch system logging.

Examples

The following example limits the switch system log file to informational messages only for name server, management server, port and switch management events:

```
[SN5428-2A]# fcswitch syslog components NameServer MgmtServer Port Switch
[SN5428-2A]# fcswitch syslog level info
```

The following example stops all switch syslog logging:

```
[SN5428-2A]# fcswitch syslog level none
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch log interface	Restrict the integrated FC switch logging to information related to a specific FC interface.
fcswitch syslog enable	Enable system logging for the integrated FC switch component.
show debug fcswitch	Display internal FC interface parameters, including switch log entries.

fcswitch syslog enable

To start system logging for the SN 5428-2 Storage Router integrated Fibre Channel (FC) switch component, use the **fcswitch syslog enable** command. To stop system logging, use the **no** form of this command.

fcswitch syslog enable

no fcswitch syslog enable

Syntax Description

This command has no arguments or keywords.

Defaults

System logging for the integrated FC switch component is started, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **fcswitch syslog enable** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example stops system logging for the integrated FC switch component. When system logging is started, logging will continue based on the existing component and notification level settings.

```
[SN5428-2A]# no fcswitch syslog enable
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch log interface	Restrict the integrated FC switch logging to information related to a specific FC interface.
fcswitch syslog	Specify logging parameters for the switch system log file.
show debug fcswitch	Display internal FC interface parameters, including switch log entries.

fcswitch zoning autosave

To enable the SN 5428-2 Storage Router to automatically save zoning changes received from switches in the fabric, use the **fcswitch zoning autosave** command. To prevent the storage router from saving zoning changes, use the **no** form of this command.

fcswitch zoning autosave enable

no fcswitch zoning autosave enable

Syntax Description

autosave enable	Enables the storage router to save zoning changes received from switches in the fabric to non-volatile memory. This is the default.

Defaults

The storage router saves zoning changes by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

By default, the SN 5428-2 Storage Router can merge into existing FC switched fabric zones and participate in the zoning. Use the **no** form of this command, in conjunction with the **fcswitch domainid** command with the **lock** keyword to prevent the storage router from participating in FC switched fabric zones.

Examples

The following example prevents the storage router from participating in FC switched fabric zones. The first command prevents the storage router from saving zoning changes received from switches in the fabric, and the second command locks the domain ID, preventing the FC switched fabric from making changes to that value.

```
[SN5428-2A]# no fcswitch zoning autosave enable
[SN5428-2A]# fcswitch domainid lock enable
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch enable	Enable all FC interfaces.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

fcswitch zoning default

To select the level of communication between the storage router and devices in the fabric when there is no active zone set, use the **fcswitch zoning default** command.

fcswitch zoning default {all | none}

Syntax Description

default all	Enables the storage router to communicate with all switches and other devices in the fabric when there is no active zone set. This is the default.
default none	When there is no active zone set, the storage router cannot communicate with any other switch or device in the fabric.

Defaults

If there is no active zone set, the storage router can communicate with all switches and other devices in the fabric, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

By default, the SN 5428-2 Storage Router can merge into existing FC switched fabric zones and participate in the zoning. Use this command to isolate the storage router and prevent communication with any switch or other device in the fabric, if there is no active zone set.

Before changing the default behavior, disconnect any ISL links to other fabric entities to prevent unintended disruption of fabric traffic.

Examples

The following example prevents the storage router from communicating with switches and all other devices in the fabric, if there is no active zone set:

```
[SN5428-2A]# fcswitch zoning default none
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch enable	Enable all FC interfaces.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning merge	Set zoning merge compliance.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

fcswitch zoning merge

To set zoning merge compliance, use the **fcswitch zoning merge** command.

fcswitch zoning merge sw2

Syntax Description

sw2	Indicates the fabric includes only FC-SW-2 compliant switches. A merge may only occur of active zoning information, ensuring all switches have identical active zone sets. This is the default.

Defaults

The SN 5428-2 Storage Router is FC-SW-2 compliant, and is configured to participate in a fabric with only FC-SW-2 compliant switches by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

By default, the SN 5428-2 Storage Router can merge into existing FC switched fabric zones and participate in the zoning. All switches in a fabric should be set to the same merge mode to prevent switches from becoming isolated from each other. By default, the storage router supports the FC-SW-2 compliant merge mode.

Examples

The following example sets the merge mode for participation in a fabric with FC-SW-2 compliant switches:

```
[SN5428-2A]# fcswitch zoning merge sw2
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch enable	Enable all FC interfaces.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

halt

To prepare the storage router to be powered down, issue the **halt** command.

halt [force] [fast]

Syntax Description

force	(Optional) Force an immediate halt of the SN 5428-2 Storage Router.
fast	(Optional) Bypass hardware diagnostics when the storage router is next restarted.

Defaults

If there are unsaved configuration changes when the command is issued, the default is to save all changes before halting. If the command is issued with the optional **force** keyword, any unsaved configuration changes are discarded.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **halt** command prepares the SN 5428-2 Storage Router file system to be powered down. If the storage router is participating in a cluster, the **halt** command will cause any SCSI routing instances running on this SN 5428-2 to failover to another storage router in the cluster.

If the **halt** command is issued with no keywords and there are unsaved changes to the current configuration, you are prompted to save or discard the changes.

Use the **force** keyword to cause an immediate halt of the storage router, discarding any unsaved configuration changes. Append the optional **fast** keyword to bypass diagnostics when the storage router is restarted.

When the **halt** command completes, the storage router displays the following system prompt:

```
[HALTED]#
```

The storage router can be safely powered down when the HALTED system prompt appears. The only CLI command that can be issued from the storage router at the HALTED system prompt is the **reboot** command.

Note When the storage router is restarted, the cluster determines any SCSI routing instances that should start on the SN 5428-2. If the storage router is identified as the preferred storage router for any SCSI routing instance (via the **scsirouter primary** command), that instance will start running on the SN 5428-2 (assuming targets and critical resources are available).

Examples

The following prompt is received if you issue a **halt** command (without the **force** keyword) when the storage router has unsaved configuration changes.

```
[SN5428-2A]# halt
*** Warning: This will halt the system.
Do you want to continue? [yes/no (no)] yes

Changes have been made to the current configuration of the system which
have not been saved.
yes    - all of the configuration data will be saved,
no     - modifications to the configuration data will not be saved.

Save ALL configuration data? [yes/no (yes)] no
Halting system.............!
[HALTED]#
```

The following example halts the SN 5428-2 Storage Router (after prompting you to save any unsaved configuration changes). Diagnostics will be bypassed when the storage router is restarted.

```
[SN5428-2A]# halt fast
```

Related Commands

Command	Description
reboot	Cause the SN 5428-2 Storage Router to shut down and then restart.

help

To display information on how to use the CLI, issue the **help** command.

help

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **help** command displays information about the various CLI commands that can be issued, based on the mode currently in use. The **help** command also displays information about the special keys that can be used in the CLI.

Examples

The following example shows the special key information returned as a result of the **help** command:

```
[SN5428-2A]# help

Special keys:
  ?                     list choices
  Backspace             delete character backward
  Tab                   complete current word
  Ctrl-A                go to beginning of line
  Ctrl-B or Arrow Left  go backward one character
  Ctrl-D                delete character
  Ctrl-E                go to end of line
  Ctrl-F or Arrow Right go forward one character
  Ctrl-K                delete from current position to end of line
  Ctrl-N or Arrow Down  go to next line in history buffer
  Ctrl-P or Arrow Up    go to previous line in history buffer
  Ctrl-T                transpose current character and previous character
  Ctrl-U                delete line
  Ctrl-W                delete previous word
```

Related Commands

Command	Description
enable	Enter Administrator mode.
exit	Leave Administrator mode and enter Monitor mode.

hostname

To specify a new system name for the SN 5428-2 Storage Router, use the **hostname** command. The storage router is recognized by this name through the management interface.

This command takes effect immediately, and the new system name is automatically integrated into the prompt string.

hostname *sysname*

Syntax Description

sysname	The name of the storage router. This may be the fully qualified domain name. Maximum length is 19 characters. The name cannot contain blanks, white space, or control characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The SN 5428-2 Storage Router must have a system name, which is assigned to the storage router during initial configuration. Use this command to change the system name.

If you wish to enable network management on the storage router using the facilities of a Domain Name Server (DNS), you must make the storage router system name and IP address known to the DNS. Use the system name specified in this command.

Examples

The following example changes the storage router name to *sn5428-2lab1*.

```
[SN5428-2A]# hostname sn5428-2lab1
```

Related Commands

Command	Description
save all	Save all configuration information.
save system	Save selected system configuration information.
show system	Display selected system information, including system name.

interface fc? al-fairness

To enable the fairness algorithm (loop priority) on the named Fibre Channel (FC) interface, use the **interface fc? al-fairness** command. To disable the fairness algorithm on the named FC interface, use the **no** form of this command.

interface *fc?* **al-fairness enable**

no interface *fc?* **al-fairness enable**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
enable	Keyword, required to enable the fairness algorithm on the named FC interface.

Defaults

The fairness algorithm is disabled on all FC interfaces by default, allowing the switch to have priority.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

When the fairness algorithm is not enabled for a specific FC interface, the switch receives priority. Use this command to enable the fairness algorithm for the named interface, removing the switch priority for that interface.

Note All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover of SCSI routing instances to provide consistent performance characteristics.

Examples

The following example enables the fairness algorithm on the FC interface named *fc6*:

```
[SN5428-2A]# interface fc6 al-fairness enable
```

The following example disables the fairness algorithm on the FC interface named *fc3*. The switch receives priority for traffic on this interface.

```
[SN5428-2A]# no interface fc3 al-fairness enable
```

Related Commands

Command	Description
interface fc? default	Return the named FC interface to its default operational characteristics.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? ms-enable	Enable GS-3 management server commands for the specified FC interface.
interface fc? type	Set the port type for the named FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? default

To return the named Fibre Channel (FC) interface to its default operational characteristics, use the **interface fc? default** command.

interface *fc?* **default**

Syntax Description

fc?	The name of the FC interface to be returned to its default operational characteristics. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.

Defaults

The following are the default operational characteristics for the Fibre Channel interface:

- fairness algorithm is disabled (switch has priority)
- Fabric Address Notification (FAN) is enabled
- transfer rate is automatically negotiated (linkspeed auto)
- Multi-Frame sequence bundling is enabled
- GS-3 management server commands are enabled
- port type is generic loop, indicating the port can function as either a fabric loop port (FL_Port), an expansion port (E_Port) or a fabric port (F_Port)
- credit extension is not enabled (ext-credit is 0)

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to quickly reset the named FC interface to its default operational characteristics. The results of this command are the same as if each of the following commands were issued for the same named FC interface:

- **no interface fc? al-fairness enable**
- **interface fc? ext-credit 0**
- **interface fc? fan-enable enable**
- **interface fc? linkspeed auto**
- **interface fc? mfs-bundle enable timeout 10**
- **interface fc? ms-enable enable**
- **interface fc? type gl-port**

Note All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover of SCSI routing instances to provide consistent performance characteristics.

Examples

The following example returns the operational characteristics to their default settings for the FC interface named *fc6*:

```
[SN5428-2A]# interface fc6 default
```

Related Commands

Command	Description
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? ms-enable	Enable GS-3 management server commands for the specified FC interface.
interface fc? type	Set the port type for the named FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? diag

To set the named Fibre Channel (FC) interface into diagnostic mode for testing purposes, use the **interface fc? diag** command.

interface *fc?* **diag**

Syntax Description

fc?	The name of the FC interface to be placed into diagnostic mode. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to change the named FC interface to diagnostic mode prior to performing an internal or external loopback test.

- Use the **interface fc? enable** command to reenable the FC interface. An FC interface must be enabled to run an online loopback test, or to allow access to storage targets.
- Use the **no interface fc? enable** command to disable the FC interface. When you are ready to allow access to the storage targets, you can enable all FC interfaces at once via the **interface fc enable** command, or enable individual interfaces via the **interface fc? enable** command.

Examples

The following example sets the FC interface *fc6* into a diagnostic state and then performs an internal loopback test:

```
[SN5428-2A]# interface fc6 diag
[SN5428-2A]# interface fc6 loopback internal
```

Related Commands

Command	Description
fcswitch diag	Set all FC interfaces into diagnostic mode for testing purposes.
fcswitch enable	Enable all FC interfaces.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.
interface fc? reset	Disable and then enable the specified FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.

interface fc? enable

To enable the named Fibre Channel (FC) interface, use the **interface fc? enable** command. To disable the named FC interface, use the **no** form of this command.

interface *fc?* **enable**

no interface *fc?* **enable**

Syntax Description

fc?	The name of the FC interface to be enabled. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An FC interface must be enabled to allow access to storage targets or perform online loopback testing. Use this command to enable an individual FC interface.

If you experience a problem with the FC interface or a specific storage resource, use the **no** form of this command to disable the named FC interface.

Examples

The following example enables the FC interface *fc6* and then performs an online loopback test:

```
[SN5428-2A]# interface fc6 enable
[SN5428-2A]# interface fc6 loopback online
```

The following example disables the FC interface *fc3*:

```
[SN5428-2A]# no interface fc3 enable
```

Related Commands

Command	Description
fcswitch diag	Set all FC interfaces into diagnostic mode for testing purposes.
fcswitch enable	Enable all FC interfaces.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? loopback	Initiate a loopback test on the named FC interface.
interface fc? reset	Disable and then enable the specified FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.

interface fc? ext-credit

To configure the specified interface for credit extension, use the **interface fc? ext-credit** command.

interface *fc?* **ext-credit** *nn*

Syntax Description

fc?	The name of the interface to receive the additional buffer credits. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
nn	The maximum number of additional buffer credits available to this interface. Valid values are 0, 11, 22, 33, 44, 55, 66 or 77.

Defaults

No extended credits are available. By default, each FC interface has 12 data buffer credits available.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

By default, each SN 5428-2 Storage Router Fibre Channel (FC) interface has a data buffer capacity of 12 maximum sized FC frames or "credits." This enables full bandwidth class 2 service over a distance of 20 kilometers at 1 Gbps, or 10 kilometers at 2 Gbps, for fibre optic cables. Longer distances can be spanned at full bandwidth by extending the credits available to an interface. An interface configured for credit extension draws on a pool of credits donated by designated donor interfaces. Each donor interface contributes 11 credits to the pool from which the recipient interfaces can draw.

In order to receive donated credits, the interface must have a running port type of E_Port, F_Port or G_Port. An interface with a running loop mode port type (FL_Port, GL_Port or translated loop) cannot receive donated credits. In order to donate credits, the interface port type must be *donor.*

Each interface with a port type of *donor* donates 11 buffer credits; all 11 buffer credits must go to a single recipient interface.

Use the **show interface** command to display the maximum data buffer credits available to an interface, and to display the ports receiving donated credits.

To make the interface unavailable for donated data buffer credits, use this command with a maximum number of additional buffer credits of 0 (zero).

Examples

The following example sets the port type for interface *fc1* to *F_Port*, sets the port type for interface *fc8* as *donor* (making 11 extended credits available to the interface fc1), and configures interface fc1 for credit extension:

```
[SN5428-2A]# interface fc8 type donor
*[SN5428-2A]# interface fc1 type f-port
*[SN5428-2A]# interface fc1 ext-credit 11
```

The following example makes the interface *fc1* unavailable for credit extension:

```
[SN5428-2A]# interface fc1 ext-credit 0
```

Related Commands

Command	Description
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
interface fc? type	Set the port type for the named FC interface.
show fcswitch	Display global configuration information for storage router FC interfaces.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? fan-enable

To enable Fabric Address Notification (FAN) on the named Fibre Channel (FC) interface, use the **interface fc? fan-enable** command. To disable FAN on the named FC interface, use the **no** form of this command.

interface *fc?* **fan-enable enable**

no interface *fc?* **fan-enable enable**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
enable	Keyword, required to enable FAN on the named FC interface.

Defaults

FAN is enabled on all FC interfaces by default

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to enable or disable FAN loop login behavior on the named FC interface.

Note All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover of SCSI routing instances to provide consistent performance characteristics.

Examples

The following example disables FAN on the FC interface named *fc6*:

```
[SN5428-2A]# no interface fc6 fan-enable enable
```

The following example enables FAN on the FC interface named *fc3*.

```
[SN5428-2A]# interface fc3 fan-enable enable
```

Related Commands

Command	Description
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? default	Return the named FC interface to its default operational characteristics.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? ms-enable	Enable GS-3 management server commands for the specified FC interface.
interface fc? type	Set the port type for the named FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? linkspeed

To set the transfer rate for the named Fibre Channel (FC) interface, use the **interface fc? linkspeed** command.

interface *fc?* **linkspeed {auto | 1gb | 2gb}**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
auto	Keyword, indicating the transfer rate will be negotiated.
1gb	Keyword, indicating the transfer rate will be fixed at 1 Gbps.
2gb	Keyword, indicating the transfer rate will be fixed at 2 Gbps.

Defaults

The transfer rate is automatically negotiated to either 1 Gbps or 2 Gbps, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to change the transfer rate for the named FC interface.

Note All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover of SCSI routing instances to provide consistent performance characteristics.

Examples

The following example sets the transfer rate for to 2 Gbps for the FC interface named *fc6*:

```
[SN5428-2A]# interface fc6 linkspeed 2gb
```

Related Commands

Command	Description
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? default	Return the named FC interface to its default operational characteristics.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? ms-enable	Enable GS-3 management server commands for the specified FC interface.
interface fc? type	Set the port type for the named FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? loopback

To initiate a loopback test on the named Fibre Channel (FC) interface, use the **interface fc? loopback** command.

interface *fc?* **loopback {external | internal | online}**

Syntax Description

fc?	The name of the FC interface to be tested. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
external	Keyword, indicating an external loopback test will be performed. The FC interface must be in a diagnostic state.
internal	Keyword, indicating an internal loopback test will be performed. The FC interface must be in a diagnostic state.
online	Keyword, indicating an online loopback test will be performed. The FC interface must be enabled.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Loopback tests are part of standard diagnostic procedures. To display the results or status of a loopback test, use the **show interface fc?** command.

Before performing a loopback test, the named FC interface must be in the correct state.

- For online loopback testing, the FC interface must be enabled. Use the **interface fc? enable** command to enable the FC interface before performing online loopback testing.
- For external or internal loopback testing, the FC interface must be in a diagnostic state. Use the **interface fc? diag** command to set the FC interface into a diagnostic state before performing external or internal loopback testing.

Examples

The following example sets the FC interface *fc6* into a diagnostic state and then performs an internal loopback test:

```
[SN5428-2A]# interface fc6 diag
[SN5428-2A]# interface fc6 loopback internal
```

The following example enables the FC interface *fc3* and then performs an online loopback test:

```
[SN5428-2A]# interface fc3 enable
[SN5428-2A]# interface fc3 loopback online
```

Related Commands

Command	Description
fcswitch diag	Set all FC interfaces into diagnostic mode for testing purposes.
fcswitch enable	Enable all FC interfaces.
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? reset	Disable and then enable the specified FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? mfs-bundle

To enable Multi-Frame Sequence (MFS) bundling for the named Fibre Channel (FC) interface, use the **interface fc? mfs-bundle** command. To disable MFS bundling for the named FC interface, use the **no** form of this command.

interface *fc?* **mfs-bundle enable timeout** *nn*

no interface *fc?* **mfs-bundle enable**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
enable	Keyword, required to enable MFS bundling on the named FC interface.
timeout *nn*	The timeout threshold, in milliseconds. Valid values are 10 through 20480. The default timeout value is 10 msecs.

Defaults

MFS bundling is enabled on all FC interfaces, by default. The default timeout value is 10 msec.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

MFS bundling is used to support systems that require frames to be sequenced in a particular order.

Note All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover of SCSI routing instances to provide consistent performance characteristics.

Examples

The following example enables MFS bundling for the FC interface named *fc6*, and sets the timeout value to 640 msecs:

```
[SN5428-2A]# interface fc6 mfs-bundle enable timeout 640
```

The following example disables MFS bundling for the FC interface named *fc3*:

```
[SN5428-2A]# no interface fc3 mfs-bundle enable
```

Related Commands

Command	Description
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? default	Return the named FC interface to its default operational characteristics.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? ms-enable	Enable GS-3 management server commands for the specified FC interface.
interface fc? type	Set the port type for the named FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? ms-enable

To enable GS-3 management server commands for the specified Fibre Channel (FC) interface, use the **interface fc? ms-enable** command. To disable GS-3 management server commands, use the **no** form of this command.

interface *fc?* **ms-enable enable**

no interface *fc?* **ms-enable enable**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
enable	Keyword, required to enable GS-3 management server commands for the named FC interface.

Defaults

GS-3 management server commands are enabled on all FC interfaces.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Enabling GS-3 management server commands for the FC interface allows in-band management of the SN 5428-2 Storage Router integrated FC switch component. GS-3 management server commands must be enabled if you want to use storage management tools to provide in-band management of the integrated FC switch component along with other switches in the fabric.

Use the **no** form of this command to disable in-band management on the specified FC interface.

Examples

The following example disables GS-3 management server commands for *fc8*:

```
[SN5428-2A]# no interface fc8 ms-enable enable
```

Related Commands

Command	Description
interface fc? default	Return the named FC interface to its default operational characteristics.
show fcswitch	Display global configuration information for storage router 2 FC interfaces.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fc? reset

To disable and then enable the specified Fibre Channel (FC) interface, use the **interface fc? reset** command.

interface *fc?* **reset**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command is functionally equivalent to issuing a **no interface fc? enable** command, followed by an **interface fc? enable** command.

After placing the FC interface into diagnostic mode and performing internal loopback testing, use this command to return the interface to an operational state.

Examples

The following example resets the FC interface named *fc3*:

```
[SN5428-2A]# interface fc3 reset
```

Related Commands

Command	Description
interface fc? diag	Set the named FC interface into diagnostic mode for testing purposes.
interface fc? enable	Enable the named FC interface.
interface fc? loopback	Initiate a loopback test on the named FC interface.

interface fc? rscn

To enable the generation of Registered State Control Notification (RSCN) messages on the specified Fibre Channel (FC) interface, use the **interface fc? rscn** command. To disable RSCN messages, use the **no** form of this command.

interface *fc?* **rscn enable**

no interface *fc?* **rscn enable**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
enable	Keyword, required to enable generation of RSCN messages on the specified interface.

Defaults

RSCN messages are generated on all FC interfaces.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Each SN 5428-2 Storage Router and FC switch contains its own local Name Server, called a distributed Name Server (dNS). By default, all SN 5428-2 Storage Routers and FC switches in the fabric distribute RSCN messages whenever a change takes place in their local dNS database. RSCN notification is used to maintain the integrity of the local dNS database.

Examples

The following example disables generation of RSCN messages on interface *fc5*:

```
[SN5428-2A]# no interface fc5 rscn enable
```

Related Commands

Command	Description
show fcswitch nameserver	Display the local Fibre Channel nameserver database.

interface fc? type

To set the port type for the named Fibre Channel interface, use the **interface fc? type** command.

interface *fc?* **type {auto | f-port | fl-port | g-port | gl-port}**

interface *fc?* **type tl-port mode {autobridge | autolearn}**

interface *fc?* **type donor**

Syntax Description

fc?	The name of the FC interface for which you are setting this parameter. Valid values are fc1 through fc8. When you type the **interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
auto	Keyword, indicating the port type is automatically negotiated and functions as a generic loop (GL_Port).
f-port	Keyword, indicating the port type is fabric. F_Ports are fabric ports.
fl-port	Keyword, indicating the port type is fabric loop (also known as "public loop").
g-port	Keyword, indicating the port type is generic and can function as either an F_Port or an E_Port. An E_Port (also known as an "expansion port") is used to link multiple FC switches together into a fabric.
gl-port	Keyword, indicating the port type is generic loop and can function as either an F_Port, an FL_Port or an E_Port.
tl-port	Keyword, indicating the port type is translated loop.
mode autobridge	Keywords, indicating public targets are made visible to the initiator in a private loop.
mode autolearn	Keywords, indicating targets in a private loop are made visible.
donor	Keyword, indicating the interface is functioning as a donor port, making 11 buffer credits available to a recipient port, configured for credit extension.

Defaults

The port type is *generic loop* (GL_Port), by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Select the appropriate port type based on the connected equipment. By default, all of the storage router FC ports are defined as self configuring GL_Ports.

- A GL_Port configures as an FL_Port when connected to a loop of public devices, an F_Port when connected to a single device, or an E_Port when connected to another SN 5428-2 or an FC-SW-2 compliant switch. A GL_Port may also configure as an E_Port when connected to a switch running non-FC-SW-2 compliant firmware.
- A G_Port configures as an F_Port when connected to a single public device or an E_Port when connected to another SN 5428-2 or an FC-SW-2 compliant switch. A G_Port may also configure as an E_Port when connected to a switch running non-FC-SW-2 compliant firmware.
- An F_Port supports connection to a single public device (N_Port).
- An FL_Port supports connection to a loop of up to 126 public devices (NL_Port).
- A TL_Port supports connection to a loop of up to 126 private devices with the ability to communicate with "off-loop" devices, such as public fabric devices and private devices on other TL_Ports. TL_Ports connect to devices that confirm to the Fibre Channel-Private Loop SCSI Direct Attach (FC-PLDA) standard. A TL_Port acts as a proxy for the off-loop device, translating private frames to and from public frames. Each TL_Port can proxy up to 64 off-loop devices.
- A donor port type indicates that the interface is donating its buffer credits and is not used for FC devices. Each donor ports donates 11 buffer credits to the pool. All of the 11 credits must go to a single recipient interface, configured for credit extension.

Public devices have full Fibre Channel addressing capability and can communicate with any other public device on the fabric; private devices do not have full FC addressing capability. Private devices have only the Arbitrated Loop Physical Address (ALPA) portion.

Note All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover of SCSI routing instances to provide consistent performance characteristics.

Examples

The following example sets the port type to fabric for the FC interface named *fc6*:

```
[SN5428-2A]# interface fc6 type f-port
```

The following example set the port type to translated loop for the FC interface named fc3. The mode is autolearn, so targets in private loop are made visible.

```
[SN5428-2A]# interface fc3 type tl-port mode autolearn
```

The following example sets the port type for interface *fc1* to *F_Port*, sets the port type for interface *fc8* as *donor* (making 11 buffer credits available to the interface fc1), and configures interface fc1 for credit extension:

```
[SN5428-2A]# interface fc1 type f-port
*[SN5428-2A]# interface fc8 type donor
*[SN5428-2A]# interface fc1 ext-credit 11
```

Related Commands

Command	Description
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? default	Return the named FC interface to its default operational characteristics.
interface fc? ext-credit	Configure the specified interface as a potential recipient of donated data buffer credits.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? ms-enable	Enable GS-3 management server commands for the specified FC interface.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface fci? devicediscoverytimer

To enable the SN 5428-2 Storage Router internal Fibre Channel (FC) interfaces to perform background device rediscovery for all attached FC targets at specific time intervals, use the **interface fci? devicediscoverytimer** command.

interface *fci?* **devicediscoverytimer** *nn*

Syntax Description

fci?	The name of the internal FC interface. Valid values are fci1 or fci2. When you type the **interface fci?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
nn	The amount of time, in minutes between automatic background device rediscovery.

Defaults

The device discovery timer value is 0, indicating that automatic background device rediscovery is disabled.

Command Modes

Administrator.

Command History

Release	Modifications
3.2.1	This command was introduced.

Usage Guidelines

Use this command to enable automatic device rediscovery on a periodic basis in environments where LUNs can be created on FC targets, but no event occurs to cause devices to be rediscovered. This situation may occur with certain RAID controllers or virtualization type devices.

You do not need to issue the **interface fci? devicediscoverytimer** command for both internal FC interfaces. When you enable automatic background device rediscovery for one internal FC interface (for example, fci1), the same setting is enabled for the other internal FC interface (for example, fci2).

When automatic background device rediscovery is enabled, use the **show interface** command with the **stats** keyword to display the current device rediscovery timer configuration.

Examples

The following example enables automatic device rediscovery every 20 minutes:

```
[SN5428-2A]# interface fci2 devicediscoverytimer 20
device discovery timer changed to 20 minutes on interface fci1
device discovery timer changed to 20 minutes on interface fci2
```

The following example disables automatic background device rediscovery by setting the device discovery timer interval to 0. (This is the default setting.)

```
[SN5428-2A]# interface fci2 devicediscoverytimer 0
device discovery timer changed to 0 minutes on interface fci1
device discovery timer changed to 0 minutes on interface fci2
```

Use the show interface command with the stats keyword to display the current device rediscovery timer configuration. In the following example, the storage router will perform background device rediscovery every 10 minutes.

```
[SN5428-2B]# show interface fci1 stats
loop:       LOOP READY
connection: F Port
Data Rate:  2 Gb/s
port id:    0x20f00
ALPA:       0x0
firmware:   READY
device rediscovery timer:   10 minutes
. . .
```

Note The device rediscovery timer information does not display if automatic background device rediscovery is not enabled.

Related Commands

Command	Description
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface ge?

To set various operational parameters associated with the Gigabit Ethernet interface, such as the size of the maximum transfer unit (MTU) or the use of VLANs, use the **interface ge?** command. To disable the use of VLANs, use the **no** form of this command. To specify that auto negotiation will never be used on this interface, use the **interface ge? no autonegotiation** command.

interface *ge?* **{autonegotiation [autodetect] | mtusize {***nn* **| default}**

interface *ge?* **no autonegotiation**

interface *ge?* **vlan enable**

no interface *ge?* **vlan enable**

Syntax Description

ge?	The name of the interface for which you are setting this parameter. When you type the **interface ge?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
autonegotiation	Auto negotiation will always be used on this interface.
autonegotiation autodetect	Automatically detect if auto negotiation should be used for this interface. This is the default setting.
mtusize *nn*	The size of the MTU, in bytes. *nn* is an integer between 1500 and 9000 inclusive.
mtusize default	Reset the value to the factory default of 1500 bytes.
vlan enable	Enable VLANs for this interface. This is the default.

Defaults

MTU size defaults to 1500 bytes. Auto negotiation defaults to *autodetect*. For storage routers deployed for SCSI routing, the use of VLANs is enabled by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

All storage routers in a cluster should be configured with the same MTU size and other interface-specific parameters, allowing failover of applications to provide consistent performance characteristics.

If the SN 5428-2 is deployed for FCIP, a larger MTU size is desirable. Set the MTU size to 9000 bytes, if possible.

Use the **no interface ge? vlan enable** command to quickly restrict VLAN functionality on the Gigabit Ethernet interface for troubleshooting purposes.

Examples

The following example enables auto negotiation on the Gigabit Ethernet interface, *ge1*. The ge1 interface will not come up until auto negotiation is successfully completed.

```
[SN5428-2A]# interface ge1 autonegotiation
```

The following example disables VLANs for the Gigabit Ethernet interface, *ge2*:

```
[SN5428-2A]# no interface ge2 vlan enable
```

The following examples changes the MTU size for the Gigabit Ethernet interface, ge1, to 9000 bytes. This is the recommended setting when the storage router is deployed for FCIP.

```
[SN5428-2A]# no interface ge2 vlan enable
```

Related Commands

Command	Description
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface ge? ip-address

To enable an IP address on a Gigabit Ethernet interface for management of the SN 5428-2 Storage Router, use the **interface ge? ip-address** command. To disable an IP address configured for storage router management, use the **no** form of this command.

interface *ge?* **[vlan** *vid***] ip-address {***A.B.C.D/bits* **|** *A.B.C.D/1.2.3.4***} [secondary** *ge?***]**

no interface *ge?* **[vlan** *vid***] ip-address**

Syntax Description

ge?	The name of the Gigabit Ethernet interface associated with this IP address. When you type the **interface ge?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
vlan *vid*	The keyword and the VLAN identifier.
A.B.C.D/bits	The IP address of the specified Gigabit Ethernet interface to be used for management of the SN 5428-2 Storage Router. If the keyword **vlan** is used, the IP address is part of the specified VLAN. The */bits* specifies the network mask in CIDR style.
A.B.C.D/1.2.3.4	The IP address of the specified Gigabit Ethernet interface to be used for management of the SN 5428-2 Storage Router. If the keyword vlan is used, the IP address is part of the specified VLAN. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.
secondary *ge?*	(Optional) The name of the Gigabit Ethernet interface to be used as a secondary interface for the specified IP address. If the primary interface goes down and remains down for two seconds, the specified IP address will be moved to the secondary interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to designate an IP address on a Gigabit Ethernet interface to be used for management of the SN 5428-2 Storage Router (in-band management). The Gigabit Ethernet IP address specified for storage router management can perform all the normal management tasks, but unlike the management interface, it cannot perform HA functions in a cluster environment if the HA interface is unavailable.

In-band management is performed via a Telnet or Secure Shell (SSH) session, or via the web-based GUI. Only one IP address per logical interface can be configured for in-band management. Telnet, SSH, HTTP and SSL access is restricted, by default, on all Gigabit Ethernet interfaces. Use the **no restrict** CLI command to allow access to the storage router using the desired protocol via the specified Gigabit Ethernet interface.

If the **secondary** keyword is used, both Gigabit Ethernet interfaces must be connected to the same network segment. If you configure a Gigabit Ethernet IP address with a secondary interface, all Gigabit Ethernet IP addresses on the same subnet must also be configured with the same secondary interface.

If you are using the Gigabit Ethernet interface IP address in configuration of external servers, such as RADIUS, TACACS+ or SNMP, that will access the storage router via this interface, reboot the storage router after configuring the Gigabit Ethernet IP address and saving the change to the system bootable configuration. This assures that the IP address is the first address associated with the specified interface.

Note The IP address used for management of the SN 5428-2 Storage Router cannot be used as a Gigabit Ethernet IP address associated with a SCSI routing instance (serverif); the IP address must not already be in use on the storage router.

Examples

The following example configures the IP address *10.1.0.244/24* on *ge1* for management of the storage router, and enables the *ge1* interface for Telnet access.

```
[SN5428-2B]# interface ge1 ip-address 10.1.0.244/24
[SN5428-2B]# no restrict ge1 telnet
```

The following example configures two IP addresses on unique logical interfaces for storage router management. The IP address *10.1.0.160/255.255.255.128* is specified as part of VLAN *100* on *ge2;* the IP address *10.1.0.168/255.255.255.128* is also on *ge2* but is not part of a VLAN. The interface *ge2* is enabled for SSH access.

```
[SN5428-2B]# interface ge2 vlan 100 ip-address 10.1.0.160/255.255.255.128
[SN5428-2B]# interface ge2 ip-address 10.1.0.168/255.255.255.128
[SN5428-2B]# no restrict ge2 ssh
```

The following example configures the IP address *10.1.0.230/24* on *ge2* for storage router management. If the *ge2* interface is unavailable, the *ge1* interface will be used. Both *ge1* and *ge2* are enabled for HTTP access.

```
[SN5428-2B]# interface ge2 ip-address 10.1.0.230/24 secondary ge1
[SN5428-2B]# no restrict ge2 http
[SN5428-2B]# no restrict ge1 http
```

The following example removes the IP address configured for storage router management from *ge1*, and restricts SSL access to the interface:

```
[SN5428-2B]# no interface ge1 ip-address
[SN5428-2B]# restrict ge1 ssl
```

The following example configures the IP address *10.1.0.212/24* on *ge2* for management of the storage router, saves the changes to the bootable configuration, and then performs a fast reboot. This assures that the IP address will be the first address associated with the ge2 interface, and allows the IP address to be used by external servers (such as RADIUS or TACACS+) to communicate with the storage router.

```
[SN5428-2B]# interface ge2 ip-address 10.1.0.212/24
*[SN5428-2B]# save all bootconfig
[SN5428-2B]# reboot fast
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show ip	Display entries from the SN 5428-2 Storage Router routing table and statistics about the protocols used in the SN 5428-2 network.
show restrict	Display configurable security settings for the storage router interfaces.

interface ha

To set various operational parameters associated with the high availability (HA) interface, such as the speed and duplex mode, use the **interface ha** command.

interface ha autonegotiation

interface ha no autonegotiation [speed {10 | 100}] [duplex {full | half}]

Syntax Description

autonegotiation	Auto negotiation will always be used on this interface. Operational characteristics will automatically be negotiated with the partner.
speed 10	(Optional) The interface speed is fixed at 10 Mbps. Auto negotiation is not used.
speed 100	(Optional) The interface speed is fixed at 100 Mbps. Auto negotiation is not used. If speed is not specified, the default is 100 Mbps.
duplex full	(Optional) The duplex setting is fixed at full. Auto negotiation is not used. If the duplex setting is not specified, the default is full duplex.
duplex half	(Optional) The duplex setting is fixed at half. Auto negotiation is not used.

Defaults

Auto negotiation is enabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to manually set a specific interface speed and duplex setting, if the partner is unable to auto negotiate these settings.

All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover to provide consistent performance characteristics. Use the **show interface ha** command to display current operating characteristics for the HA interface.

Examples

The following example disables auto negotiation, and sets the interface speed to 10 Mbps, duplex full:

```
[SN5428-2A] interface ha no autonegotiation speed 10 duplex full
```

Related Commands

Command	Description
interface ha ip-address	Specify the HA interface IP address and subnet mask.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface ha ip-address

To specify the IP address and subnet mask for this system's high availability interface, use the **interface ha ip-address** command.

interface ha ip-address {*A.B.C.D/bits* | *A.B.C.D/1.2.3.4*}

Syntax Description

A.B.C.D/nn	The IP address of the HA interface. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style.
A.B.C.D/1.2.3.4	The IP address of the HA interface. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The HA features are used within a cluster of storage routers. Each member of the cluster communicates over the HA and management interfaces, exchanging heartbeats and other configuration information, allowing for failover in case of system problems.

The HA interface and the management interface must be on unique IP subnets. In a cluster, the HA interfaces for all nodes should be on the same IP subnet.

After initial system configuration, use the **setup cluster** command to change the configuration of the high availability environment.

For SN 5428-2 Storage Routers deployed for transparent SCSI routing, or standalone storage routers deployed for SCSI routing, the HA interface is optional.

Examples

The following example assigns the IP address of 10.1.20.56/24 to the HA interface:

```
[SN5428-2B]# interface ha ip-address 10.1.20.56/24
```

Related Commands

Command	Description
interface mgmt ip-address	Specify the management interface IP address and subnet mask.
save all	Save all configuration information.
save system	Save selected system configuration information, including HA IP address.
setup cluster	Change the configuration of the high availability environment.
show cluster	Display cluster-related operational statistics, including heartbeat information.
show ha	Display HA operational statistics for the storage router or for a specific application.

interface mgmt

To set various operational parameters associated with the management interface, such as the speed and duplex mode, use the **interface mgmt** command.

interface mgmt autonegotiation

interface mgmt no autonegotiation [speed {10 | 100}] [duplex {full | half}]

Syntax Description

autonegotiation	Auto negotiation will always be used on this interface. Operational characteristics will automatically be negotiated with the partner.
speed 10	(Optional) The interface speed is fixed at 10 Mbps. Auto negotiation is not used.
speed 100	(Optional) The interface speed is fixed at 100 Mbps. Auto negotiation is not used. If speed is not specified, the default is 100 Mbps.
duplex full	(Optional) The duplex setting is fixed at full. Auto negotiation is not used. If the duplex setting is not specified, the default is full duplex.
duplex half	(Optional) The duplex setting is fixed at half. Auto negotiation is not used.

Defaults

Auto negotiation is enabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to manually set a specific interface speed and duplex setting, if the partner is unable to auto negotiate these settings.

All storage routers in a cluster should be configured with the same interface-specific parameters, allowing failover to provide consistent performance characteristics. Use the **show interface mgmt** command to display current operating characteristics for the management interface.

Examples

The following example disables auto negotiation, and sets the interface speed to 10 Mbps, duplex full:

```
[SN5428-2A] interface mgmt no autonegotiation speed 10 duplex full
```

Related Commands

Command	Description
interface mgmt ip-address	Specify the management interface IP address and subnet mask.
show interface	Display operational and configuration information for the specified interface or all interfaces.

interface mgmt ip-address

To specify the IP address and subnet mask of the interface labeled MGMT on the front panel of the SN 5428-2 Storage Router, use the **interface mgmt ip-address** command. This address is used to manage the storage router via Telnet, Secure Shell (SSH), the web-based GUI, or SNMP.

interface mgmt ip-address {*A.B.C.D/bits* | *A.B.C.D/1.2.3.4*}

Syntax Description

A.B.C.D/bits	The IP address of the management interface. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style.
A.B.C.D/1.2.3.4	The IP address of the management interface. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The management and HA interfaces must be on unique IP subnets. In a cluster, the management interfaces for all nodes should be on the same IP subnet.

Examples

The following example assigns the IP address of *10.1.10.244/24* to the management interface:

```
[SN5428-2A]# interface mgmt ip-address 10.1.10.244/24
```

Related Commands

Command	Description
interface ha ip-address	Specify the HA interface IP address and subnet mask.
ip route	Add a static route to the SN 5428-2 Storage Router routing table.
save all	Save all configuration information.
save system	Save selected system configuration information, including management and HA interface information.
setup mgmt	Run the wizard to configure the management interface.
show cluster	Display cluster-related operational statistics, including heartbeat information.
show interface	Display operational and configuration information for the specified interface or all interfaces.

ip default-gateway

To add a gateway to the default route in the SN 5428-2 Storage Router routing table, use the **ip default-gateway** command. To delete the gateway, use the **no** form of this command.

ip default-gateway *E.F.G.H* **[***administrative-distance***]**

no ip default-gateway [*A.B.C.D***]**

Syntax Description

E.F.G.H	The default gateway IP address.
administrative-distance	(Optional) The administrative distance for the route. Valid values are 0 to 255 inclusive. The default administrative distance is 1.
A.B.C.D	(Optional) The IP address of the default route. The gateway to this route will be removed.

Defaults

The default administrative distance for a static route is 1.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

All IP interfaces in the SN 5428-2 use the routing table to reach services and networks outside their local network. Other facilities, such as SNMP and connections to an NTP server or DNS servers, may also use the routing table. Use the **ip default-gateway** command to add a gateway to the default route in this table.

Only one default route is allowed in the routing table.

Note This command is functionally equivalent to issuing the **ip route** command for IP address 0.0.0.0/00.

The administrative distance is used to determine which route to install in the routing table when there are multiple routes to the same destination. The default administrative distance for static routes is 1; the administrative distance for dynamic routes created by RIP is 120. The route with the lower administrative distance is installed in the routing table (as long as the interface used by the route is up).

By default, a static route will always override a dynamic route learned by RIP. To modify this behavior, change the administrative distance of a static route to a value greater than 120.

Examples

The following example adds a default route to gateway *10.3.40.1* in the routing table. The administrative distance is 1, by default.

```
[SN5428-2A]# ip default-gateway 10.3.40.1
```

The following example adds a default route to gateway *10.3.30.1*, with an administrative distance of *130*, in the routing table. If RIP is enabled for the storage router, the default route can be overridden by a dynamically learned route.

```
[SN5428-2A]# ip default-gateway 10.3.30.1 130
```

Related Commands

Command	Description
ip route	Add a static route to the SN 5428-2 Storage Router routing table.
show ip	Display entries from the SN 5428-2 Storage Router routing table and statistics about the protocols used in the storage router network.
show route	Display the default routes.

ip domain-name

To specify the name of the SN 5428-2 Storage Router domain, use the **ip domain-name** command. To remove a domain name, use the **no** form of this command.

ip domain-name *name*

no ip domain-name

Syntax Description

name	The name of the SN 5428-2 Storage Router domain.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **ip domain-name** command in conjunction with the **ip name-server** command. The storage router requires access to a DNS if any IP addresses are entered as host names via any of the storage router management interfaces, or if the management interface IP address is to be correlated with a DNS host name.

Note If the DNS is outside the storage router management subnet, use the **ip route** command to add an appropriate gateway IP address to the routing table.

Examples

The following example assigns the domain name *abc123z.com* to the storage router.

```
[SN5428-2A]# ip domain-name abc123z.com
```

Related Commands

Command	Description
ip default-gateway	Configure a gateway for the default route.
ip name-server	Specify the IP addresses of a primary (and optional secondary) DNS.
ip route	Add a static route to the SN 5428-2 Storage Router routing table.
setup mgmt	Run the wizard to configure the management interface.

ip name-server

To specify the IP address of the primary and optional secondary Domain Name Server (DNS), use the **ip name-server** command. To remove the settings for current domain name servers, use the **no** form of this command.

ip name-server *A.B.C.D* **[***E.F.G.H***]**

no ip name-server

Syntax Description

A.B.C.D	The IP address of a primary Domain Name Server, accessible by the storage router. *A.B.C.D* is the dotted quad notation of the IP address.
E.F.G.H	(Optional) The IP address of a secondary DNS, accessible by the storage router. *E.F.G.H* is the dotted quad notation of the IP address.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Configuration
3.2.1	This command was introduced.

Usage Guidelines

The storage router requires access to a DNS if any IP addresses are entered as host names via any of the storage router management interfaces, or if the management interface IP address is to be correlated with a DNS host name. To use the services of a DNS, you must also assign a domain name to the storage router via the **ip domain-name** command.

If the DNS is outside the storage router management subnet, use the **ip route** command to add an appropriate gateway IP address to the routing table.

Examples

The following example assigns the domain name *abc123z.com* to the storage router, and assigns the IP address of the primary DNS to *10.1.40.243* and the secondary DNS to *10.1.50.249*:

```
[SN5428-2A]# ip domain-name abc123z.com
[SN5428-2A]# ip name-server 10.1.40.243 10.1.50.249
```

Related Commands

Command	Description
ip default-gateway	Configure a gateway for the default route.
ip domain-name	Assign a domain name to the SN 5428-2 Storage Router.
ip route	Add a static route to the SN 5428-2 Storage Router routing table.
setup mgmt	Run the wizard to configure the management interface.

ip radius sourceinterface

To specify a single network interface to be used as the source IP address for all outgoing AAA authentication requests to RADIUS servers, use the **ip radius sourceinterface** command. To disable this restriction, use the **no** form of this command.

ip radius sourceinterface *if-name*

no ip radius sourceinterface

Syntax Description

if-name	The name of the interface to which you are restricting all outgoing AAA authentication requests to RADIUS servers. When you type the **IP radius sourceinterface ?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to restrict all outgoing AAA authentication requests to RADIUS servers to a single interface.

Examples

The following example restricts all outgoing AAA authentication requests to RADIUS servers to the Gigabit Ethernet interface *ge1*:

```
[SN5428-2A]# ip radius sourceinterface ge1
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
show aaa	Display AAA configuration information.

ip rip enable

To enable the SN 5428-2 Storage Router to learn dynamic routing using the routing information protocol (RIP), use the **ip rip enable** command. To disable dynamic routing via RIP, use the **no** form of this command.

ip rip enable

no ip rip enable

Syntax Description

This command has no arguments or keywords.

Defaults

RIP is disabled by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Routing Information Protocol (RIP) is an Interior Gateway Protocol (IGP) for dynamic routing and uses a distance vector algorithm to determine the best route between nodes in an Autonomous System (AS).

The SN 5428-2 Storage Router is a passive, or silent, RIP device; it updates routes based on RIP advertisements but it does not advertise. The storage router listens for advertised routes, learning routing information dynamically as it is exchanged in the network. The storage router supports both RIP version 1 (v1) and RIP version 2 (v2).

The SN 5428-2 RIP implementation runs RIP v2 in broadcast mode. This allows the storage router to learn from either RIP v1 or RIP v2 hosts that are operating in broadcast mode. The storage router will not learn routes from RIP v2 hosts operating in multicast mode.

If you are using RIP in your network, you can enable RIP support on the storage router. RIP eliminates or reduces the need to configure static routes for the storage router, because the storage router updates the route table based on the RIP advertisements.

The storage router can learn a maximum of 200 routes. Additional routes that are received are silently ignored. In the routing table, a static route will always override a dynamic route by default. To modify this behavior, change the administrative distance of a static route to a value greater than 120.

Examples

The following example enables RIP for the SN 5428-2 Storage Router:

```
[SN5428-2A]# ip rip enable
[SN5428-2A] Dec 09 17:54:16: %IP-5-IRMRSAR: RIP Services are running
```

The following command disables RIP:

```
[SN5428-2A]# no ip rip enable
```

Related Commands

Command	Description
ip rip timers	Configure various RIP timers.
show ip	Display entries from the SN 5428-2 Storage Router routing table, and statistics about the protocols used in the storage router network. Use the **rip** keyword to display RIP configuration information.

ip rip timers

To configure various RIP timers, use the **ip rip timers** command.

ip rip timers invalid {*nn* **| default}**

Syntax Description

invalid *nn*	Specifies the maximum time, in seconds, between updates before a route is expired and made a candidate for removal from the routing table.
default	Keyword, used to return the specified timer to the default value. The default invalid timer is180 seconds.

Defaults

The RIP invalid timer defaults to 180 seconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Routing Information Protocol (RIP) is an Interior Gateway Protocol (IGP) for dynamic routing and uses a distance vector algorithm to determine the best route between nodes in an Autonomous System (AS).

The SN 5428-2 Storage Router is a passive, or silent, RIP device; it updates routes based on RIP advertisements but it does not advertise. The storage router listens for advertised routes, learning routing information dynamically as it is exchanged in the network. The storage router supports both RIP version 1 (v1) and RIP version 2 (v2).

The SN 5428-2 RIP implementation runs RIP v2 in broadcast mode. This allows the storage router to learn from either RIP v1 or RIP v2 hosts that are operating in broadcast mode. The storage router will not learn routes from RIP v2 hosts operating in multicast mode.

The storage router can learn a maximum of 200 routes. Additional routes that are received are silently ignored. In the routing table, a static route will always override a dynamic route by default. To modify this behavior, change the administrative distance of a static route to a value greater than 120.

Timers are used to configure the timing of RIP activities. The invalid timer configures the maximum amount of time between updates of the internal route table. Use the **default** keyword to return a RIP timer to its default value.

Examples

The following example sets the RIP invalid timer to a value of 200 seconds and saves all configuration changes. This is the maximum amount of time between updates before a route is marked as expired.

```
[SN5428-2A]# ip rip timers invalid 200
*[SN5428-2A]# save all bootconfig
```

Related Commands

Command	Description
ip rip enable	Enable the storage router to learn dynamic routing using the routing information protocol (RIP).
show ip	Display entries from the SN 5428-2 Storage Router routing table, and statistics about the protocols used in the storage router network. Use the **rip** keyword to display RIP configuration information.

ip route

To add a static route to the SN 5428-2 Storage Router routing table, use the **ip route** command. The specified IP address is accessed via the gateway specified in the command. To remove a static route from the routing table, use the **no** form of this command.

ip route {*A.B.C.D/bits* | *A.B.C.D/1.2.3.4*} *E.F.G.H* [*administrative-distance*]

no ip route {*A.B.C.D/bits* | *A.B.C.D/1.2.3.4*} [*E.F.G.H*]

Syntax Description

A.B.C.D/bits	The IP address of the static route. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style.
A.B.C.D/1.2.3.4	The IP address of the static route. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask.
E.F.G.H	The gateway IP address through which the static route (*A.B.C.D/bits* or *A.B.C.D/1.2.3.4*) is accessed.
administrative-distance	(Optional) The administrative distance for the route. Valid values are 0 to 255 inclusive. The default administrative distance is 1.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

All IP interfaces in the storage router use the routing table to reach services and networks outside their local network. Other facilities, such as SNMP and connections to an NTP server or DNS servers, may also use the routing table. Use the **ip route** command to specify routes for servers or networks outside the local networks associated with the storage router IP interfaces.

Use the **show ip route** command to display the SN 5428-2 Storage Router routing table. Use the **show route** command to display all the default routes, included the routes that have been configured but not added to the routing table.

The administrative distance is used to determine which route to install in the routing table when there are multiple routes to the same destination. The default administrative distance for static routes is 1; the administrative distance for dynamic routes created by RIP is 120. The route with the lower administrative distance is installed in the routing table (as long as the interface used by the route is up).

By default, a static route will always override a dynamic route learned by RIP. To modify this behavior, change the administrative distance of a static route to a value greater than 120.

Note A route is not added to the routing table until the associated IP gateway address is configured. The CLI displays an informational message if a route is added for an IP address that is not yet configured.

Examples

The following command adds a unique route for IP address *10.1.30.0*, specifying the subnet mask in dotted quad notation:

```
[SN5428-2A]# ip route 10.1.30.0/255.255.255.0 10.1.10.10
```

The following command adds a unique route for IP address 10.1.40.0, using gateway 10.1.10.10, which is not yet on a locally connected network. The message indicates that the route has been configured but has not yet been made operational in the storage router.

```
[SN5428-2A]# ip route 10.1.40.0/24 10.1.10.10
Oct 25 19:25:17: %UI-4-NMREEO1: Gateway 10.1.10.10 used by route 10.1.40.0/24 is currently
unreachable
```

The following command adds a unique route for IP address *10.1.20.0* with an administrative distance of *130*, in the routing table. If RIP is enabled for the storage router, the route can be overridden by a dynamically learned route.

```
[SN5428-2A]# ip route 10.1.20.0/24 10.1.10.10 130
```

Related Commands

Command	Description
ip default-gateway	Configure a gateway for the default route.
ip domain-name	Assign a domain name to the SN 5428-2 Storage Router.
ip name-server	Specify the IP addresses of a primary (and optional secondary) DNS.
show ip	Display entries from the SN 5428-2 Storage Router routing table, and statistics about the protocols used in the storage router network.
show route	Display the default routes.

ip tacacs sourceinterface

To specify a single network interface to be used as the source IP address for all outgoing AAA authentication requests to TACACS+ servers, use the **ip tacacs sourceinterface** command. To disable this restriction, use the **no** form of this command.

ip tacacs sourceinterface *if-name*

no ip tacacs sourceinterface

Syntax Description

if-name	The name of the interface to which you are restricting all outgoing AAA authentication requests to TACACS+ servers. When you type the **IP tacacs sourceinterface ?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to restrict all outgoing AAA authentication requests to TACACS+ servers to a single interface.

Examples

The following example restricts all outgoing AAA authentication requests to TACACS+ servers to the management interface, *mgmt*:

```
[SN5428-2A]# ip tacacs sourceinterface mgmt
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

logging #?

To insert a routing rules entry into the logging table before the specified entry, use the **logging #?** command.

logging #?

logging #*nn* **level** *notification-level* **from** *facility-name* **to** *destination1 [destination2...]*

Syntax Description

#?	Request an indexed list of entries in the logging table.
#*nn*	The index number from the displayed list of entries. The new routing rule will be inserted before the specified logging table entry.
notification-level	Limit logging to messages of a specified level or lower levels. See Table 12-10 in the Usage Guidelines section for a list of valid names that can be used for the *notification-level* argument.
from *facility-name*	The name of the facility. A facility is the feature area from which the message is received. See Table 12-11 in the Usage Guidelines section for a list of valid facility names. Each facility can have eight notification levels. Each notification level can have up to seven destination.
to *destination1 [destination2...]*	At least one of the destinations described in Table 12-12.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Event, trace and debug messages can be routed to various destinations, based on the notification level of the message and the application area (facility) that generated the message. When a log message is received by the storage router, the logging table rules are searched by facility name and by message level until a match is found. The log message is sent to all the destinations specified by the matching rule.

New routing rules are normally appended to the existing rules in the table. Use this command to insert a routing rule at a specific location within the table.

To display an indexed lists of entries in the logging table, use the number sign (#) character followed by a question mark (?). That action will cause the routing rules in the logging table to be displayed as a numbered (indexed) set of lines. The command is displayed at the prompt below the list to the point of the # keyword. Complete the command by entering the appropriate index number and the desired keywords and variables to compose the new routing rule. The new routing rule will be added to the table before the specified entry.

The level limits logging to messages of the specified notification level or lower levels, based on level number. Table 12-10 describes the available logging levels.

Table 12-10 Logging Level Notification Levels and Corresponding Numbers

Notification Level	Level Number	Description
emergency	0	System unusable
alert	1	Immediate action needed
critical	2	Critical conditions
error	3	Error conditions
warning	4	Non-fatal warning conditions
notice	5	Normal but significant conditions
info	6	Informational messages only
debug	7	Information for troubleshooting purposes

Note The debug notification level should be used for specific troubleshooting purposes only. System performance and HA behavior may be adversely affected by logging at the debug notification level.

Each facility can have up to eight notification levels. Each facility and notification level pair can have up to seven destinations. Table 12-11 describes the available facility names.

Table 12-11 Logging Level Facilities

Facility Name	Description
all	All facilities.
AUTH	AAA authentication.
CDP	Cisco Discovery Protocol.
CONF	Configuration functions.
FC	Fibre Channel interfaces.
FCIP	FCIP functions.
GE	Gigabit Ethernet interfaces.
HA	High availability cluster functions.
IF	Interface manager.
INVALID	Generic functions.
IP	IP functions.
ISCSI	iSCSI functions.
MON	Hardware monitor.
SLP	Service Location Protocol service functions.
SNMP	Simple Network Management Protocol.
SYSLOG	Syslog functions.

Table 12-11 Logging Level Facilities (continued)

Facility Name	Description
UI	User interface functions.
VTP	VTP and VLAN functions.

Table 12-12 describes the available logging destinations.

Table 12-12 Logging Level Destinations

Destination	Description
all	Logs to all destinations.
none	No logging occurs.
console	Logs to serial console CLI sessions.
logfile	Logs messages to the storage router log file.
rslog	Logs messages to a remote syslog server. Use the **logging syslog** command to specify the IP address of the remote syslog server.
vty	Logs to all Telnet, SSH, or other virtual terminal CLI sessions.

Use the **save system bootconfig** or **save all bootconfig** commands to save the list of log route entries. To delete a log route entry by its index number, use the **delete logging** command.

Examples

The following example displays an indexed list of the routing rules in the logging table, and then inserts an entry to log anything from the HA facility with notification level of notice (or lower) to all logging destinations before the third entry. The **show logging** command displays the newly inserted entry.

```
[SN5428-2A]# logging #?

[SN5428-2A]# logging #?
Index Level     Priority Facility    Route
1     critical  2        all         console vty logfile
2     debug     7        SNMP        rslog
3     warning   4        CDP         rslog

[SN5428-2A]# logging #3 level notice from HA to all

[SN5428-2A]# show logging
Logging is enabled

Index Level     Priority Facility   Route
1     critical  2        all        console vty logfile
2     debug     7        SNMP       rslog
3     notice    5        HA         all
4     warning   4        CDP        rslog

Syslog host is enabled, ip-address is 10.1.1.144
```

Related Commands

Command	Description
clear logging table	Clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults.
delete logging	Delete a rule from the logging table.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
logging on	Enable or temporarily disable logging of storage router event message.
logging syslog	Identify a remote syslog host to be used to log messages.
save all	Save all configuration information, including the log route entries list.
save system	Save selected system configuration information, including log route entries list.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.
show system	Display selected system information.

logging level

To add a routing rule to the logging table, use the **logging level** command.

logging level *notification-level* **from** *facility-name* **to** *destination1 [destination2...]*

Syntax Description

notification-level	Limit logging to messages of a specified level or lower levels. See Table 12-13 in the Usage Guidelines section for a list of valid names that can be used for the *notification-level* argument.
from *facility-name*	The name of the facility. A facility is the feature area from which the message is received. See Table 12-14 in the Usage Guidelines section for a list of valid facility names. Each facility can have eight notification levels. Each notification level can have up to seven destination.
to *destination1 [destination2...]*	At least one of the destinations described in Table 12-15.

Defaults

The factory default logging rules are as follows:

- All messages from all facilities at notice level or lower levels are logged to all destinations.
- All messages from all facilities at info level or lower levels are logged to the storage router log file.
- All messages from all facilities at debug level are not logged.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced

Usage Guidelines

Event, trace and debug messages can be routed to various destinations, based on the notification level of the message and the application area (facility) that generated the message. When a log message is received by the storage router, the logging table rules are searched by facility name and by notification level until a match is found. The log message is sent to all the destinations specified by the matching rule. When a new routing rule is added, it is appended to the existing list of entries.

Messages are sent in the following format:

```
<timestamp>: %<facility>-<level_number>-<mnemonic>: <message text>
```

The following is an example log message, for the SNMP facility:

```
Mar 18 11:48:05: %SNMP-5-SASAS: SnmpApp starting...
```

Each facility can have up to eight notification levels. The notification level limits logging to messages of the specified level or lower levels, based on level number. Table 12-13 describes the available logging levels.

Each facility and notification level pair can have up to seven destinations. Table 12-14 describes the available facility names.

Table 12-13 Logging Level Notification Levels and Corresponding Numbers

Notification Level	Level Number	Description
emergency	0	System unusable
alert	1	Immediate action needed
critical	2	Critical conditions
error	3	Error conditions
warning	4	Non-fatal warning conditions
notice	5	Normal but significant conditions
info	6	Informational messages only
debug	7	Information for troubleshooting purposes

Note The debug notification level should be used for specific troubleshooting purposes only. System performance and HA behavior may be adversely affected by logging at the debug notification level.

Table 12-14 Logging Level Facilities

Facility Name	Description
all	All facilities.
AUTH	AAA authentication.
CDP	Cisco Discovery Protocol.
CONF	Configuration functions.
FC	Fibre Channel interfaces.
FCIP	FCIP functions.
GE	Gigabit Ethernet interfaces.
HA	High availability cluster functions.
IF	Interface manager.
INVALID	Generic functions.
IP	IP functions.
ISCSI	iSCSI functions.
MON	Hardware monitor.
SLP	Service Location Protocol service functions.
SNMP	Simple Network Management Protocol.
SYSLOG	Syslog functions.
UI	User interface functions.
VTP	VTP and VLAN functions.

Table 12-15 describes the available logging destinations.

Table 12-15 Logging Level Destinations

Destination	Description
all	Logs to all destinations.
none	No logging occurs.
console	Logs to console CLI sessions.
logfile	Logs messages to the storage router log file.
rslog	Logs messages to a remote syslog server. Use the **logging syslog** command to specify the IP address of the remote syslog server.
vty	Logs to all Telnet, SSH, or other virtual terminal CLI sessions.

Use the **save system bootconfig** or **save all bootconfig** commands to save the logging table

To delete a routing rule from the logging table, use the **delete logging** command.

Note Any message that does not have a matching rule in the logging table is discarded.

Examples

The following example logs anything from the HA facility with notification level of notice (or lower) to all logging destinations.

```
[SN5428-2A]# logging level notice from HA to all
```

The following example logs messages from all facilities with a notification level of warning or lower to all destinations. (If this is the only rule in the logging table, any message with a notification level of debug, info or notice is discarded and not logged.) The log route entries are saved to the bootable configuration of the storage router.

```
[SN5428-2A]# logging level warning from all to all
[SN5428-2A]# save system bootconfig
```

Related Commands

Command	Description
clear logging table	Clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults.
delete logging	Delete a rule from the logging table.
logging #?	Insert a routing rule entry into the storage router logging table.
logging on	Enable or temporarily disable logging of storage router event message.
logging syslog	Identify a remote syslog host to be used to log messages.
save all	Save all configuration information, including the log route entries list.
save system	Save selected system configuration information, including log route entries list.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.
show system	Display selected system information.

logging on

To enable logging of SN 5428-2 Storage Router event messages based on the rules in the logging table, use the **logging on** command. To temporarily disable logging of all event messages, use the **no** form of this command.

logging on

no logging on

Syntax Description

This command has no arguments or keywords.

Defaults

Logging is enabled by default. The factory default logging rules are as follows:

- All messages from all facilities at notice level or lower levels are logged to all destinations.
- All messages from all facilities at info level or lower levels are logged to the storage router log file.
- All messages from all facilities at debug level are not logged.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **no** form of this command to quickly disable logging of all messages. For example, if there is an error condition that is overwhelming the console with messages, enter **no logging on** to temporarily disable logging without changing the logging table. Use the **logging on** command to re-enable logging when the problem is resolved.

Examples

The following example temporarily disables logging of all event messages:

```
[SN5428-2A]# no logging on
```

Related Commands

Command	Description
clear logging table	Clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults.
delete logging	Delete a rule from the logging table.
logging #?	Insert a routing rule entry into the storage router logging table.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
logging syslog	Identify a remote syslog host to be used to log messages.
save all	Save all configuration information, including the log route entries list.
save system	Save selected system configuration information, including log route entries list.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.
show system	Display selected system information.

logging syslog

To identify a remote syslog host to be used to log SN 5428-2 Storage Router event messages, use the **logging syslog** command. Use the **no** form of this command to disable remote logging.

logging syslog *A.B.C.D*

no logging syslog

Syntax Description

A.B.C.D	The IP address of the syslog host to be used for remote logging.

Defaults

Remote logging is disabled by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command identifies a remote syslog host to receive storage router event messages.

- Use the **logging level** command with the destination keyword **rslog** to configure the messages to be logged to the remote host.
- Use the **no logging syslog** command to disable remote logging.
- Use the **delete logging** command to remove specific logging table entries.
- Use the **show logging** command to display the status of remote logging and the IP address of the remote syslog server.

Examples

The following example identifies the IP address of the remote syslog host as *10.1.1.144* and adds a entry to the logging table to route all emergency level messages to that remote host.

```
[SN5428-2A]# logging syslog 10.1.1.144
[SN5428-2A]# logging level emergency from all to rslog
```

Related Commands

Command	Description
clear logging table	Clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults.
delete logging	Delete a rule from the logging table.
logging #?	Insert a routing rule entry into the storage router logging table.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
logging on	Enable or temporarily disable logging of storage router event message.
save all	Save all configuration information, including the remote logging configuration.
save system	Save selected system configuration information, including remote logging information.
show logging	Display the routing rules in the logging table and the contents of the storage router log file.
show system	Display selected system information.

logout

To terminate the current CLI management session, use the **logout** command.

logout

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

- If you are connected to the storage router in Administrator mode or Monitor mode via a Telnet or SSH session, the **logout** command terminates the CLI management session. No CLI commands can be issued until you log in again.
- If you are connected to the storage router in Administrator mode via the console interface, the **logout** command returns the session to Monitor mode (like the **exit** command).
- If you are connected to the storage router in Monitor mode via the console interface, the **logout** command has no effect. If console passwords are enabled, you are immediately prompted for the Monitor mode password.

Related Commands

Command	Description
enable	Enter Administrator mode.
exit	Leave Administrator mode and enter Monitor mode.

monitor password

To set the password used for view-only access to the SN 5428-2 Storage Router management interface, use the **monitor password** command. Access may be via Telnet or SSH (for CLI) or web-based GUI.

monitor password *string*

Syntax Description

string	A case-sensitive password associated with view-only access to the storage router management interface. The default password is *cisco*.

Defaults

The default password is *cisco*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The management interface is password protected. You must enter passwords when accessing the storage router via the CLI or web-based GUI. (Passwords can also be applied to the console interface. See the **restrict console** command for additional information.) The Monitor mode password provides view-only access to the management interface, while the Administrator mode password allows you to create entities and make changes to the configuration of the storage router system.

To clear the Monitor mode password, set the password string to “” , effectively setting it to nothing.

Note If Login authentication is enabled for the storage router, users are prompted for both a user name and a password when accessing the storage router via a console, Telnet or SSH management session.

In a cluster environment, the Administrator mode and Monitor mode passwords are cluster-wide configuration elements and apply to all storage routers in a cluster. The password management functions are handled by a single storage router. To determine which storage router is performing password management functions, issue the **show cluster** command. If you issue the **monitor password** command from a storage router that is not performing password management functions, the CLI displays an informational message with the name of the node that is currently handling those functions.

Examples

The following example sets the Monitor mode password to *M17g23*. All passwords are case sensitive.

```
[SN5428-2A]# monitor password M17g23
```

Note The password is displayed in clear text as the command is entered, but it is changed to a series of number signs (#####) when the change is acknowledged.

Related Commands

Command	Description
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa generate password	Generate a long random password.
admin password	Set the login password for administrative access to the management interface.
enable	Enter Administrator mode.
exit	Leave Administration mode and enter Monitor mode.
save all	Save all configuration information, including the Monitor mode password.
save system	Save selected system information, including the Monitor mode password.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.

ntp peer

To specify the name or IP address of a Network Time Protocol (NTP) server with which the SN 5428-2 Storage Router will synchronize date and time, use the **ntp peer** command. To clear the current NTP server setting, use the **no** form of this command.

ntp peer{*A.B.C.D* | *server-name*}

no ntp peer

Syntax Description

A.B.C.D	The IP address of the NTP server with which the storage router synchronizes date and time. *A.B.C.D* is the dotted quad notation of the IP address.
server-name	The name of the NTP server with which the storage router synchronizes date and time. In order to specify a server name, the storage router must be configured to use a DNS server using the **ip name-server** command.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The storage router must provide accurate date and time information for log files and user interfaces. It will use the services of the NTP server to keep the date and time synchronized with the rest of the network.

If the NTP server is outside the storage router management subnet, use the **ip route** command to add an appropriate gateway IP address to the routing table.

Examples

The following example sets the IP address of the NTP server for the storage router to *10.1.60.86*.

```
[SN5428-2A]# ntp peer 10.1.60.86
```

Related Commands

Command	Description
clock set	Set the storage router system clock.
clock timezone	Specify the time zone associated with the storage router.
ip route	Add a static route to the SN 5428-2 Storage Router routing table.
save all	Save all configuration information.
save system	Save selected system information, including NTP server name.
setup time	Run the wizard to configure the system date and time.
show clock	Display the current system date and time, including the system time zone.
show system	Display selected system information, including NTP server address.

ping

To verify communication with another SN 5428-2 Storage Router or system in the network, use the **ping** command.

ping {*ip-address* | *servername*} **[numpkts** *nn*] **[size** *sn*]

Syntax Description

ip-address	The IP address of another system or SN 5428-2 Storage Router.
servername	The name of another server. The storage router must be configured to use the services of a Domain Name Server (DNS).
numpkts *nn*	(Optional) The maximum number of pings that may be sent. The default value is five.
size *sn*	(Optional) The size of each ping packet, in bytes. The minimum size is 64 bytes; the maximum size is 4096 bytes. The default is 64 bytes.

Defaults

The default setting is to attempt five 64-byte pings.

Command Modes

Administrator or Monitor. The optional **numpkts** and **size** keywords are not available in Monitor mode.

Command History

Release	Modification
3.2.1	This command was introduced.
3.3.1	The optional **numpkts** and **size** keywords are restricted to Administrator mode only.

Usage Guidelines

Use this command to verify that there is a TCP/IP communication path to another SN 5428-2 Storage Router or system in the network.

Examples

The following example attempts to verify the communication path to the IP address 10.1.30.17, using the default size and maximum number of packets:

```
[SN5428-2A]# ping 10.1.30.17
```

The following example attempts to reach the IP address 10.1.30.17 by sending up to three pings, each consisting of a 120-byte packet. You must be logged on in Administrator mode to execute this command.

```
[SN5428-2A]# ping 10.1.30.17 numpkts 3 size 120
```

Related Commands

Command	Description
show ip	Display entries from the SN 5428-2 Storage Router routing table and statistics about the protocols used in the storage router network.

radius-server deadtime

To improve RADIUS response time when some servers might be unavailable, use the **radius-server deadtime** command to cause the storage router to skip the unavailable servers immediately. To set the dead time to 0, effectively preventing the storage router from skipping any RADIUS server, use the **no** form of this command.

radius-server deadtime *minutes*

no radius-server deadtime

Syntax Description

minutes	The length of time, in minutes, for which a RADIUS server is skipped over by the storage router when requesting AAA authentication services, up to a maximum of 1440 minutes (24 hours).

Defaults

The dead time is set to zero (0) by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to cause the storage router to mark as "dead" any RADIUS servers that fail to respond to authentication requests, thus avoiding the wait for the authentication request to time out before trying the next configured server. A RADIUS server marked as dead is skipped by additional requests for the specified number of minutes, unless all RADIUS servers are marked as dead. If all RADIUS servers are marked as dead, the deadtime setting is ignored.

This is a global command that applies to all configured RADIUS servers. To override the global dead time setting for a specific group of RADIUS server, use the **aaa group server radius deadtime** command.

Examples

The following example specifies a dead time of five minutes for all RADIUS servers that fail to respond to AAA authentication requests:

```
[SN5428-2A]# radius-server deadtime 5
```

The following example effectively sets a dead time of zero minutes for all RADIUS servers. The storage router will wait for any AAA authentication request to a RADIUS server to time out before retransmitting or retrying the next configured server.

```
[SN5428-2A]# no radius-server deadtime
```

Related Commands

Command	Description
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
show aaa	Display AAA configuration information.

radius-server host

To specify a RADIUS server to be used for AAA authentication services, use the **radius-server host** command. To delete the specified RADIUS server, use the **no** form of this command.

radius-server host *ip-address* **[auth-port** *port-number***] [timeout** *seconds***] [retransmit** *retries***] [key** *key-string***]**

no radius-server host *ip-address* **[auth-port** *port-number***]**

Syntax Description

ip-address	The IP address of the RADIUS server.
auth-port *port-number*	(Optional) The UDP destination port for authentication requests. If unspecified, the port number defaults to 1645.
timeout *seconds*	(Optional) The host-specific time interval that the storage router waits for the RADIUS server to reply before retransmitting. Enter a value in the range of 1 to 1000. This setting overrides the global value of the **radius-server timeout** command. If no timeout value is specified, the global value is used.
retransmit *retries*	(Optional) The number of times a RADIUS request is resent to the RADIUS server, if the server is not responding or responding slowly. Enter a value in the range of 0 to 100. A value of 0 disables RADIUS request retransmission. This setting overrides the global setting of the **radius-server retransmit** command. If no retransmit value is specified, the global value is used.
key *key-string*	(Optional) The authentication and encryption key for all RADIUS communications between the storage router and the RADIUS server. This key must match the encryption used on the RADIUS daemon. If spaces are used in the key, enclose the key in quotation marks. This key overrides the global setting of the **radius-server key** command. If no key string is specified, the global value is used.

Defaults

No RADIUS server is specified.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

AAA authentication services are used to provide the following authentication types:

- iSCSI authentication—provides authentication of IP hosts requiring access to storage via SCSI routing instances
- Login authentication—provides authentication of users requiring Monitor mode access to the storage router via the CLI
- Enable authentication—provides authentication of users requiring Administrator mode access to the storage router via the CLI **enable** command

You can use multiple **radius-server host** commands to specify multiple RADIUS servers. AAA authentication searches for servers in the order in which you specify them.

Use the **aaa group server radius server** command to add a RADIUS server to a server group. If you delete a RADIUS server, delete the server from the RADIUS server using the **no aaa group server radius server** command.

If no host-specific timeout, retransmit, or key values are specified, the global values apply to each RADIUS server.

A retransmit value of zero (0) disables RADIUS request retransmission.

If you use spaces in the key, enclose the key in quotation marks.

Note Verification of IP addresses in a server group occurs only at runtime. If a RADIUS server group contains an IP address that is not defined as a RADIUS server, the authentication process generates error messages and the IP address is skipped. This could cause unexpected authentication failures.

Examples

The following example identifies the server with IP address *10.5.0.53* as the RADIUS server and uses the default port for authentication:

```
[SN5428-2A]# radius-server host 10.5.0.53
```

The following example identifies port 1612 as the destination port for authentication requests on the RADIUS server *10.6.0.61*:

```
[SN5428-2A]# radius-server host 10.6.0.61 auth-port 1612
```

The following example identifies the server with IP address *10.5.0.53* as the RADIUS server, uses ports 1612 as the authorization port, sets the timeout value to 6, sets the retransmit value to 5, and sets “rad123” as the encryption key, matching the key on the RADIUS server:

```
[SN5428-2A]# radius-server host 10.5.0.53 auth-port 1612 timeout 6 retransmit 5 key rad123
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
aaa test authentication	Enable testing of the specified AAA authentication list.
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
radius-server key	Sets the global authentication and encryption key for all RADIUS communications between the storage router and the RADIUS daemon.
radius-server retransmit	Specifies how many times the storage router resends the RADIUS request to a server before giving up.
radius-server timeout	Sets the interval the storage router waits for a RADIUS server to reply before retransmitting.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

radius-server key

To set the authentication and encryption key to be used for all RADIUS communications between the SN 5428-2 Storage Router and the RADIUS daemon, use the **radius-server key** command. To disable the key, use the **no** form of this command.

radius-server key *key-string*

no radius-server key

Syntax Description

key-string	The authentication and encryption key string to be used for all RADIUS communications, in clear text. If spaces are used in the key, enclose the key in quotation marks.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **radius-server key** command to set the global authentication and encryption key to be used by the storage router for communications with RADIUS servers. The key entered as part of the command must match the key used on the RADIUS daemon. If the key includes spaces, enclose the key in quotation marks.

To override the global key for a specific RADIUS server, use the **radius-server host** command with the **key** keyword.

Examples

The following example sets the global authentication and encryption key to *my key string*:

```
[SN5428-2A]# radius-server key "my key string"
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
radius-server retransmit	Specifies how many times the storage router resends the RADIUS request to a server before giving up.
radius-server timeout	Sets the interval the storage router waits for a RADIUS server to reply before retransmitting.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

radius-server retransmit

To specify the number of times the SN 5428-2 Storage Router resends the RADIUS request to each server in the list of configured RADIUS servers after a timeout occurs, use the **radius-server retransmit** command. To disable retransmission, use the **no** form of this command.

radius-server retransmit *retries*

no radius-server retransmit

Syntax Description

retries	The number of times the request can be resent to each server in the list. Enter a value in the range of 0 to 100. A value of zero (0) disables RADIUS request retransmission. The default is 3.

Defaults

The number of possible resends defaults to three.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If multiple RADIUS servers are configured for AAA authentication, the storage router attempts to reach each server in the list before incrementing the retransmit count. To disable RADIUS request retransmission, set the retransmit count to zero.

To override the global retransmit count for a specific RADIUS server, use the **radius-server host** command with the **retransmit** keyword.

Examples

The following example sets the retransmit count to six, meaning the request can be resent up to six times for every RADIUS server:

```
[SN5428-2A]# radius-server retransmit 6
```

The following example disables RADIUS request retransmission by setting the retransmit count to zero:

```
[SN5428-2A]# radius-server retransmit 0
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
radius-server key	Sets the global authentication and encryption key for all RADIUS communications between the storage router and the RADIUS daemon.
radius-server timeout	Sets the interval the storage router waits for a RADIUS server to reply before retransmitting.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

radius-server timeout

To set the global interval that the SN 5428-2 Storage Router waits for a RADIUS server to reply, use the **radius-server timeout** command. To restore the default, use the **no** form of this command.

radius-server timeout *seconds*

no radius-server timeout

Syntax Description

seconds	The global timeout value in seconds. Enter a value in the range of 1 to 1000. The default is 5.

Defaults

The timeout value defaults to five seconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to set the number of seconds the storage router waits for a RADIUS server to reply before timing out.

To override the global timeout value for a specific RADIUS server, use the **radius-server host** command with the **timeout** keyword.

Examples

The following example sets the global timeout value to 10. You may want to increase the timeout value if you have network problems or if the RADIUS servers are slow to response, which causes consistent timeouts when a lower timeout value is used.

```
[SN5428-2A]# radius-server timeout 10
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server radius deadtime	Specify the length of time the storage router can skip a RADIUS server in the named group that is marked as unavailable.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
radius-server deadtime	Specify the length of time the storage router can skip a RADIUS server that is marked as unavailable.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
radius-server key	Sets the global authentication and encryption key for all RADIUS communications between the storage router and the RADIUS daemon.
radius-server retransmit	Specifies how many times the storage router resends the RADIUS request to a server before giving up.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

read script

To read and execute the CLI commands in a command file, use the **read script** command.

read script *command-file* **[force [***parameters***]]**

Syntax Description

command-file	The name of the command file. The command file must exist in the *script* directory.
force	(Optional) Suppress warning prompts and messages and execute the script immediately.
parameters	(Optional) Pass one or more parameters to the specified script. If the parameter includes spaces, enclose it in quotation marks.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show bootconfig** and **show runningconfig** commands with the **to** keyword to create basic files containing many of the CLI commands that were issued to create the SN 5428-2 Storage Router bootable or currently running configuration. These files can be modified and used as command files to automate common tasks.

You can also manually create a command file. If you have a set of CLI commands that you run periodically, you can place them in a command file, copy that file to the storage router *script* directory and use the **read script** command to execute them when needed.

Each command should be on a separate line or contain a backslash (\ ) as the line continuation character at the end of the line. At the end of a continuation sequence, add a blank line as a separator between the sequence and any following command. Any line beginning with an exclamation mark (!) or a number sign (#) is considered to be a comment and will not be executed.

When the command is issued without the **force** keyword, you are reminded that the action may change the configuration of the storage router and are then prompted to confirm your actions. When the command is issued with the force keyword, all warning prompts and messages are suppressed and the script is executed immediately.

You can also pass optional parameters to the script to control processing. Any parameter that includes spaces must be enclosed in quotation marks. Within the script, use the key character "@" to instruct the script execution function to substitute the value of the specified parameter. Whenever the execution function encounters @1, it substitutes the value of the first passed parameter. The value of the second parameter is substituted for @2, and so forth.

See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for additional information about using scripts to automate tasks.

Examples

The following example reads and executes the CLI commands in the command file named *myCommands*.

```
[SN5428-2A]# read script myCommands
*** Warning: this script may change your configuration.
Do you want to continue? [yes/no (yes)] yes
```

Related Commands

Command	Description
show bootconfig	Display the bootable configuration, or create a command file based on the bootable configuration.
show cli	Display the syntax of CLI commands.
show runningconfig	Display the running configuration, or create a command file based on the running configuration.
show script	Display the contents of the *script* directory or the contents of the named command file.

reboot

To cause the SN 5428-2 Storage Router to shut down and then restart, issue the **reboot** command.

Note Rebooting may cause the storage router to run a different version of software. See the **software version** command for details.

reboot [force] [fast]

Syntax Description

fast	(Optional) Force a soft reboot of the storage router, bypassing hardware diagnostics.
force	(Optional) Force an immediate reboot of the storage router.

Defaults

If there are unsaved configuration changes when the command is issued, the default is to save all changes before rebooting. If the command is issued with the optional **force** keyword, any unsaved configuration changes are discarded.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If the storage router is participating in a cluster, the **reboot** command will cause any SCSI routing instances running on this storage router to failover to another node in the cluster. At restart, the cluster determines any SCSI routing instances that should start on the storage router. If the SN 5428-2 is identified as the preferred storage router for any SCSI routing instance (via the **scsirouter primary** command), that instance will start running on the SN 5428-2 (assuming targets and critical resources are available).

If the **reboot** command is issued with no keywords and there are unsaved changes to the current configuration, you can choose to either save all changes or reboot without saving any changes.

Use the **force** keyword to cause an immediate reboot of the storage router, discarding any unsaved configuration changes. Append the optional **fast** keyword to bypass diagnostics during the reboot sequence.

Examples

The following prompt is received if you issue a **reboot** command (without the **force** keyword) when the storage router has unsaved configuration changes.

```
[SN5428-2A]# reboot
*** Warning: This will reboot the system.
Do you want to continue? [yes/no (no)] yes

Changes have been made to the current configuration of the system which
have not been saved.
yes    - all of the configuration data will be saved,
no     - modifications to the configuration data will not be saved.

Save ALL configuration data? [yes/no (yes)] yes
Halting system.........
```

The following example reboots the storage router (after prompting you to save any unsaved configuration changes) but bypasses diagnostics during the reboot process:

```
[SN5428-2A]# reboot fast
```

Related Commands

Command	Description
halt	Prepare the SN 5428-2 Storage Router to be powered down.
software version	Specify the version of software to run when the storage router is restarted.

restore aaa

To cause the AAA authentication configuration to be copied from the specified configuration file into persistent memory, use the **restore aaa** command. The configuration file must exist in the *savedconfig* directory. To display the contents of the *savedconfig* directory, issue the **show savedconfig** command.

Note If the storage router belongs to a cluster, the restored AAA configuration information will automatically be propagated to other members of that cluster.

restore aaa from *filename*

Syntax Description

from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **restore** command overwrites all existing AAA configuration information, including any user name and passwords in the local username database, RADIUS and TACACS+ configuration information, and the AAA authentication lists used for iSCSI, Enable, and Login authentication.

Note In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue a **restore aaa** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following example restores the AAA authentication configuration from the saved configuration file named *aaa_backup*:

```
[SN5428-2A]# restore aaa from aaa_backup
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa generate password	Generate a long random password.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
delete savedconfig	Remove a saved configuration file from the storage router.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.

restore accesslist

To cause the named access list or all access lists to be copied from the specified configuration file into persistent memory, use the **restore accesslist** command. The configuration file must exist in the *savedconfig* directory. To display the contents of the *savedconfig* directory, issue the **show savedconfig** command.

Note If the storage router belongs to a cluster, the restored access list information will automatically be propagated to other members of that cluster.

restore accesslist {*name* **| all} from** *filename*

Syntax Description

name	The name of the access list to be restored.
all	Keyword to restore all access lists.
from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If the access list currently exists in some form, the **restore** command does not delete existing information. The **restore** command adds missing entries, or overwrites existing entries of the same name, but never purges or deletes existing access list entries. If necessary, you can delete an access list and all its entries and then restore it from a saved configuration file.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

Note In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue a **restore accesslist** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, “Maintaining and Managing the SN 5428-2 Storage Router,” for more information about operating the storage router in a cluster.

Examples

The following example restores the access list named *fooList* from the saved configuration file named *accessList_backup*:

```
[SN5428-2A]# restore accesslist fooList from accessList_backup
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
restore all	Restore all the contents of the named configuration file into memory.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or for all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.

restore all

To cause all the previously saved configuration information to be copied from the specified configuration file into persistent memory, use the **restore all** command. The configuration file must exist in the *savedconfig* directory. Use the **show savedconfig** command to display the contents of the *savedconfig* directory.

Note This command may change the running configuration of the storage router.

restore all from *filename*

Syntax Description

from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **restore all** command restores all information from the named configuration file. Depending on the information that is restored, the running configuration of the storage router may be changed.

A **restore** command may overwrite or delete existing items. However, the **restore** command will not purge or delete existing items from access lists, but will add missing items or overwrite existing items of the same name. If necessary, you may delete access lists, or any other item to be restored, before restoring from a saved configuration file.

The **restore all** command will not restore the route table and RIP settings, the Fibre Channel (FC) zoning database, or the logging table. Use the **restore system ip-route** command to restore a saved route table and RIP settings, and the **restore fcswitch zones** command to restore the FC zoning database. Use the **restore system logging** command to restore the logging table.

SCSI routing instances and FCIP instances must be stopped before they can be restored. Use the **no scsirouter enable** command to stop active SCSI routing instances. Use the **no fcip enable** command to stop an active FCIP instance. After the restore is complete, use the **scsirouter enable** command to start the restored SCSI routing instances. Restored FCIP instances are automatically restarted.

Note In a cluster environment, all AAA, access list, password, and VLAN management functions are handled by a single storage router. To determine which storage router is performing these management functions, issue the **show cluster** command. If you issue the **restore all** command from a storage router that is not performing these management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following example restores all configuration data contained in the configuration file named *foo_backup* into persistent memory:

```
[SN5428-2A]# restore all from foo_backup
```

Related Commands

Command	Description
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
restore aaa	Restore AAA authentication services from the named configuration file.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore fcswitch	Restore Fibre Channel configuration information from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
restore system	Restore selected system information from the named configuration file.
restore vlan	Restore VLAN configuration information from the named configuration file.
save aaa	Save the current AAA configuration information.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter enable	Stop or start the named SCSI routing instance.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.

restore fcip

To cause the previously saved configuration information related to the named FCIP instance to be copied from the specified configuration file into the bootable configuration, use the **restore fcip** command. The configuration file must exist in the *savedconfig* directory. Use the **show savedconfig** command to display the contents of the *savedconfig* directory.

Note This does not change the running configuration of the storage router.

restore fcip {*name* | **all**} **from** *filename*

Syntax Description

name	The name of the FCIP instance to be restored. Valid names are *fcip1* and *fcip2*.
all	Keyword to restore all FCIP instances.
from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

The FCIP instance should be inactive before it is restored. Use the **no fcip enable** command to stop an active FCIP instance so it can be restored. After the specified FCIP instance is restored, it is automatically enabled and the running configuration of the storage router is updated.

A **restore** command never deletes existing FCIP instances. The **restore** command will add missing instances and will overwrite configuration information for existing instances of the same name. If necessary, you can delete the FCIP instance and then restore it from a saved configuration file.

Examples

The following example restores the FCIP instance *fcip1* from the configuration file named *fcip_backup001*:

```
[SN5428-2A]# restore fcip fcip1 from fcip_backup001
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip enable	Stop or start the named FCIP instance.
save fcip	Save configuration information for the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

restore fcswitch

To cause the previously saved configuration information associated with the SN 5428-2 Storage Router Fibre Channel (FC) interfaces to be copied from the specified configuration file into the bootable configuration, use the **restore fcswitch** command. The configuration file must exist in the *savedconfig* directory. Use the **show savedconfig** command to display the contents of the *savedconfig* directory.

restore fcswitch {all | config | interface | zones} from *filename*

Syntax Description

all	Keyword used to restore all global and interface-specific FC configuration information from the specified configuration file. **Note** Zoning information is not restored.
config	Keyword used to restore global FC configuration information, including time out values and domain ID.
interface	Keyword used to restore configuration information for the FC interfaces, including link speed and port type settings.
zones	Keyword used to restore all alias, zone and zone set configuration information. If the storage router is connected to the FC switched fabric, the restored zoning database is propagated to the FC switched fabric
from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **restore fcswitch** command overwrites the specified FC configuration information.

Use the **config** keyword to restore global FC configuration information, including:

- The domain ID and domain ID lock setting
- Resource allocation timeout value
- Distributed services timeout value
- Fabric stability timeout value
- Error detect timeout value
- Buffer-to-buffer credit value for all FC ports
- Zoning management operational settings, including merge mode and level of communication between the storage router and devices in the fabric when there is no active zone set

Use the **interface** keyword to restore configuration information for each FC port, including:

- State of the interface (enabled or disabled)
- Fairness algorithm
- FAN
- MFS bundling and associated timeout value
- Transfer rate (linkspeed)
- Port type

Use the **zones** keyword to restore the internal zoning database, including:

- Aliases and alias members
- Zones and zone members
- Zone sets and zone set members
- Active zone set information

Caution If the SN 5428-2 Storage Router is connected to the FC switched fabric, the restored zoning database information is propagated throughout the fabric.

Examples

The following example restores the configuration information for all FC interface from the configuration file named *fc_config_08152002*:

```
[SN5428-2A]# restore fcswitch interface from fc_config_08152002
```

The following example restore all global and interface-specific FC configuration information from the configuration file named *SN5428-2A_L2*:

```
[SN5428-2A]# restore fcswitch all from SN5428-2A_L2
```

Related Commands

Command	Description
delete fcalias	Delete the named alias or the specified alias member.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? type	Set the port type for the named FC interface.
restore all	Restore all the contents of the named configuration file into memory.
save fcswitch	Save all Fibre Channel configuration, including global configuration settings and zoning information.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.

restore scsirouter

To cause the previously saved configuration information related to the named SCSI routing instance to be copied from the specified configuration file into the bootable configuration, use the **restore scsirouter** command. The configuration file must exist in the *savedconfig* directory. Use the **show savedconfig** command to display the contents of the *savedconfig* directory.

Note This does not change the running configuration of the storage router.

restore scsirouter {*name* **| all} from** *filename*

Syntax Description

name	The name of the SCSI routing instance to be restored.
all	Keyword to restore all SCSI routing instances.
from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A SCSI routing instance must be inactive before it can be restored. Use the **no scsirouter enable** command to stop an active SCSI routing instance so it can be restored. After the specified SCSI routing instance is restored, issue the **scsirouter enable** command to start the instance and update the running configuration of the storage router.

A **restore** command never deletes existing SCSI routing instances. The **restore** command will add missing instances and will overwrite configuration information for existing instances of the same name. If necessary, you can delete a SCSI routing instance and then restore it from a saved configuration file.

Examples

The following example restores the SCSI routing instance *foo* from the configuration file named *scsi_backup001*:

```
[SN5428-2A]# restore scsirouter foo from scsi_backup001
```

Related Commands

Command	Description
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore all	Restore the contents of the named configuration file into memory.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter target maxcmdqueuedepth	Specify the maximum number of commands allowed at any given time from each iSCSI session to the specified target.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.

restore system

To cause previously saved system configuration information to be copied from the specified configuration file into persistent memory, use the **restore system** command. The configuration file must exist in the *savedconfig* directory. Use the **show savedconfig** command to display the contents of the *savedconfig* directory.

restore system {*name* **| all} from** *filename*

Syntax Description

name	The named system information to be restored. See Table 12-16 in the Usage Guidelines section for a list of valid names that can be used for the *name* argument.
all	Restore all restorable system information (except the route table and RIP settings, and the logging table) from the saved configuration file. Restorable system information includes CDP configuration, administrator contact data, DNS and NTP information, restrict configuration, remote logging data, SNMP configuration, Telnet and Secure Shell (SSH) settings, and the default download location for updated storage router software. **Note** The route table, RIP settings, and the logging table, are not restored.
from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Table 12-16 describes the named system information that can be restored.

Table 12-16 Restore System Named System Information

Named System Configuration	Description
cdp	Restore CDP configuration.
contactinfo	Restore administrator contact information.
ip-route	Restore the route table and RIP settings.
logging	Restore the routing rules in the storage router event message logging table. Restored rules are appended to the end of the table.
name-server	Restore DNS configuration.
ntp	Restore NTP server configuration.
remotelog	Restore IP address of host used for remote logging.
restrict	Restore the storage router restrict configuration.
snmp	Restore SNMP configuration.
software	Restore the default software download location and user name and password information for HTTP, proxy, and TFTP.
ssh	Restore the Secure Shell (SSH) configuration information.
telnet	Restores the session timeout value for Telnet and SSH management sessions.

Some system information that is saved when the **save system** command is issued is not available for restoration from a saved configuration file. Use the **show savedconfig** command to display the contents of the specified configuration file. The following configuration information is available for display but cannot be restored:

- Management and HA interface IP addresses
- Gigabit Ethernet interface configuration information
- Administrator mode and Monitor mode passwords
- HA configuration mode

Examples

The following example restores all restorable system configuration information (except the route table and the logging table) from the saved configuration file *system_backup*:

```
[SN5428-2A]# restore system all from system_backup
```

The following example restores the route table and RIP settings from the saved configuration file *system_backup*:

```
[SN5428-2A]# restore system ip-route from system_backup
[SN5428-2A]# restore system rip from system_backup
```

The following example restores the logging table from the saved configuration file *system_backup*:

```
[SN5428-2A]# restore system logging from system_backup
```

The following example restores the SNMP configuration information from the saved configuration file *sys_SN5428-2A*:

```
[SN5428-2A]# restore system snmp from sys_SN5428-2A
```

Related Commands

Commands	Description
delete savedconfig	Remove a saved configuration file from the storage router.
restore all	Restore the contents of the named configuration file into memory.
save all	Save all configuration information.
save system	Save selected system configuration information.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.

restore vlan

To cause the specified VLAN to be copied from the named configuration file into persistent memory, use the **restore vlan** command. The configuration file must exist in the *savedconfig* directory. To display the contents of the *savedconfig* directory, issue the **show savedconfig** command.

Note If the SN 5428-2 Storage Router belongs to a cluster, the restored VLAN configuration information will automatically be propagated to other members of that cluster.

restore vlan {*vid* | **all**} **from** *filename*

Syntax Description

vid	The VLAN identification number.
all	Restore all VLAN definitions.
from *filename*	The name of the configuration file containing the information to be restored. This file must exist in the *savedconfig* directory.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If the VLAN currently exists, the **restore vlan** command overwrites existing configuration information with the information from the named configuration file. The **restore vlan** command also restores the VTP configuration information.

Note In a cluster environment, VLAN management functions are handled by a single storage router. To determine which storage router is performing VLAN management functions, issue the **show cluster** command. If you issue a **restore vlan** command from a storage router that is not performing VLAN management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following example restores VLAN *100* from the *vlanBackup* file:

```
[SN5428-2A]# restore vlan 100 from vlanBackup
```

Related Commands

Command	Description
save vlan	Save configuration information for the named VLAN or all VLANs
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.
show vlan	Display configuration and operational information for the specified VLAN or all VLANs.
show vtp	Display configuration and operational information for VTP.
vlan	Configure a non-VTP VLAN on the storage router.
vtp domain	Assign a VTP domain name to the storage router.
vtp mode	Configure the storage router to operate in client or transparent VTP mode.

restrict

To close access to the specified interface via the named service, use the **restrict** command. To allow access via the named service, use the **no** form of this command.

restrict all [*service*]

restrict *interface* {*service* | **all**}

no restrict all [*service*]

no restrict *interface* {*service* | **all**}

Syntax Description

interface	Restrict access to the specified interface. See Table 12-17 in the Usage Guidelines section for a list of interface names.
service	Restrict access via the specified service or protocol. See Table 12-18 in the Usage Guidelines section for a list of service names.
all	Restrict all interfaces or all services.

Defaults

The following are factory default settings:

- FTP using port 21 is restricted on all interfaces.
- HTTP using port 80 is allowed on the management and HA interfaces. It is restricted on the Gigabit Ethernet interfaces.
- Remote login (rlogin) using port 513 is restricted on all interfaces.
- SNMP using port 161 is allowed on the management interface only. It is restricted on the HA and Gigabit Ethernet interfaces.
- SSH using port 22 is allowed on the management interface only. It is restricted on the HA and Gigabit Ethernet interfaces.
- SSL using port 443 is restricted on all interfaces.
- Telnet using port 23 is allowed on the management interface only. It is restricted on the HA and Gigabit Ethernet interfaces.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **restrict** command to restrict unauthorized access to storage router interfaces. Use the **show restrict** command to display the current interface and service restrictions.

You can restrict access on the interfaces listed in Table 12-17.

Table 12-17 restrict interface

Interface Keyword	Description
ge*?*	The Gigabit Ethernet interfaces (including all logical interfaces created by associating a VLAN with a Gigabit Ethernet IP address for a SCSI routing instance). All services are restricted on the Gigabit Ethernet interfaces by default.
ha	The HA interface. This interface is open to HTTP by default.
mgmt	The management interface. This interface is open to Telnet, HTTP, SNMP and SSH by default.

You can restrict access to the storage router interfaces by the services or protocols, shown in Table 12-18.

Table 12-18 restrict interface service

Service Keyword	Description
ftp	File Transfer Protocol. FTP access is restricted on all interfaces, by default.
http	Hypertext Transfer Protocol. HTTP access is available on the management and HA interfaces, by default.
rlogin	Remote login on port 513. If rlogin is enabled for an interface, the setting is only valid until the storage router is restarted. The rlogin setting is not retained across a storage router restart; rlogin returns to a restricted state for all interfaces. **Note** Rlogin is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.
ssh	Secure Shell. SSH can be used as a replacement for Telnet and remote login. SSH is enabled on the management interface by default; it is restricted on all other interfaces. **Note** The SSH service is started, by default. Use the **no ssh enable** command to stop the SSH service (disabling access via SSH) without changing the restrict settings.
snmp	Simple Network Management Protocol. SNMP is enabled on the management interface by default.

Table 12-18 restrict interface service (continued)

Service Keyword	Description
ssl	Secure Socket Layer. SSL is restricted on all interfaces by default.
telnet	Telnet. Telnet access is enabled on the management interface by default; it is restricted on all other interfaces. **Note** The Telnet server is started by default. Use the **no telnet enable** command to stop the Telnet server (disabling access via Telnet) without changing the restrict settings.

To access the GUI using an SSL connection, enable SSL on the appropriate interface and change the URL to use “https” instead of “http.”

To completely disable the SN 5428-2 GUI, restrict HTTP access to all interfaces.

Examples

The following example restricts HTTP access to the management interface, preventing access to the web-based GUI from this interface:

```
[SN5428-2A]# restrict mgmt http
```

The following example restricts Telnet access to the HA interface:

```
[SN5428-2A]# restrict ha telnet
```

The following example restricts access to all interfaces via FTP.

```
[SN5428-2A]# restrict all ftp
```

The following example enables SSL on the management interface.

```
[SN5428-2A]# no restrict mgmt ssl
```

The following example enables SSH on the Gigabit Ethernet interface, *ge1*:

```
[SN5428-2A]# no restrict ge1 ssh
```

Related Commands

Command	Description
restrict console	Enable or disable password checking on the console interface.
show restrict	Display configurable security settings for the storage router interfaces.
ssh enable	Enable SSH and start the SSH service.
ssh keygen	Generate a Secure Shell (SSH) public and private key pair for the storage router.
telnet enable	Enable Telnet and start the Telnet server.

restrict console

To enable password checking on the SN 5428-2 Storage Router console interface, use the **restrict console** command. The Administrator mode and Monitor mode passwords will be required when accessing the storage router via a console connected to the EIA/TIA-232 port. To disable password checking on the console interface, use the **no** form of this command.

restrict console

no restrict console

Syntax Description

This command has no arguments or keywords.

Defaults

Passwords are disabled on the console interface.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command if you need to restrict access to the console interface.

Examples

The following example enables password checking on the console interface:

```
[SN5428-2A]# restrict console
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show restrict	Display configurable security settings for the storage router interfaces.

save aaa

To save the current AAA settings to nonvolatile memory, use the **save aaa** command.

save aaa {*filename* | **bootconfig**}

Syntax Description

filename	The name of the file where the AAA configuration information will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the AAA settings to the bootable configuration, which is used when the SN 5428-2 Storage Router is restarted. If the storage router belongs to a cluster, the saved AAA settings will automatically be propagated to other members of that cluster.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Use the *filename* parameter to save the AAA configuration to a file. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

The following information is saved:

- The AAA authentication lists
- The username database
- All RADIUS server configuration information (including server groups)
- All TACACS+ server configuration information (including server groups)

Note In a cluster environment, AAA management functions are handled by a single storage router. To determine which storage router is performing AAA management functions, issue the **show cluster** command. If you issue the **save aaa** command from a storage router that is not performing AAA management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following example saves the running AAA settings to the bootable configuration, used when the storage router is restarted:

```
[SN5428-2A]# save aaa bootconfig
```

The following example saves the running AAA settings to a file named *aaa_SN5428-2A*:

```
[SN5428-2A]# save aaa aaa_SN5428-2A
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
delete savedconfig	Remove a saved configuration file from the storage router.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save accesslist	Save configuration data for the named access list or for all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
username password	Add a user name and optional password to the local username database.

save accesslist

To save configuration data to nonvolatile memory for the named accesslist or for all access lists, use the **save accesslist** command.

save accesslist {*name* **| all} {***filename* **| bootconfig}**

Syntax Description

name	The name of the access list to be saved.
all	Save all access lists.
filename	The name of the file where the running access list configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the access list from the running configuration to the bootable configuration, used when the SN 5428-2 Storage Router is restarted. If the storage router belongs to a cluster, the saved access list information will automatically be propagated to other members of that cluster.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Configurations saved to a file can be moved between storage routers, and can be restored at a later time.

There is a maximum of 100 access lists per storage router or per storage router cluster. There is a maximum of 200 access list identification entries across all access lists in the storage router or storage router cluster.

Note In a cluster environment, access list management functions are handled by a single storage router. To determine which storage router is performing access list management functions, issue the **show cluster** command. If you issue the **save accesslist** command from a storage router that is not performing access list management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following example saves the current configuration for all access lists to the bootable configuration, used when the storage router is restarted:

```
[SN5428-2A]# save accesslist all bootconfig
```

The following example saves the access list *fooList* to a configuration file named *fooList_SN5428-2A*:

```
[SN5428-2A]# save accesslist fooList fooList_SN5428-2A
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete savedconfig	Remove a saved configuration file from the storage router.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save aaa	Save the current AAA configuration information.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
show accesslist	Display the contents of the named access list or all access lists.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.

save all

To save all configuration data for the SN 5428-2 Storage Router to nonvolatile memory, use the **save all** command.

save all {*filename* | **bootconfig**}

Syntax Description

filename	The name of the file where the configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the current running configuration information to the bootable configuration, used when the SN 5428-2 Storage Router is restarted. If the storage router belongs to a cluster, any saved cluster elements will automatically be propagated to other members of that cluster.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Depending on the deployment, the **save all** command saves AAA configuration, SCSI routing instances, FCIP instances, access lists, VLANs, global Fibre Channel (FC) settings and FC interface configurations, and selected system configuration information. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

Note In a cluster environment, all AAA, access list, password, and VLAN management functions are handled by a single storage router. To determine which storage router is performing these management functions, issue the **show cluster** command. If you issue the **save all** command from a storage router that is not performing these management functions, the CLI displays an informational message with the name of the node that is currently handling the functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

Examples

The following example saves the current running configuration to the bootable configuration:

```
[SN5428-2A]# save all bootconfig
```

The following example saves the current running configuration to the file named *SN5428-2A_03Nov2001*. You may want to do this as a means of archiving the current running configuration of the storage router on a regular basis.

```
[SN5428-2A]# save all SN5428-2A_03Nov2001
```

Related Commands

Command	Description
delete savedconfig	Remove a saved configuration file from the storage router.
restore all	Restore the contents of the named configuration file into memory.
save aaa	Save current AAA configuration information.
save accesslist	Save configuration data for the named access list or for all access lists.
save fcip	Save configuration information for the named FCIP instance.
save fcswitch	Save all Fibre Channel configuration, including global configuration settings and zoning information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or all VLANs.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.

save fcip

To save all configuration data associated with the named FCIP instance to nonvolatile memory, use the **save fcip** command.

save fcip {*name* **| all} {***filename* **| bootconfig}**

Syntax Description

name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.
all	Save configuration data for all FCIP instances.
filename	The name of the file where the configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the FCIP instance from the running configuration to the bootable configuration, used when the SN 5428-2 Storage Router is restarted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Maintenance
3.3.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

Examples

The following example saves all FCIP instances currently running on this SN 5428-2 to the bootable configuration, used when the storage router is restarted:

```
[SN5428-2A]# save fcip all bootconfig
```

The following example saves the FCIP instance named *fcip1* to the file named *fcip_SN5428-2A*:

```
[SN5428-2A]# save fcip fcip1 fcip_SN5428-2A
```

Related Commands

Command	Description
fcip	Create an FCIP instance.
fcip enable	Stop or start the named FCIP instance.
restore fcip	Restore the named SCSI routing instance from the named configuration file.
show fcip	Display configuration and operational information for the named FCIP instance.

save fcswitch

To save all configuration data for the SN 5428-2 Storage Router Fibre Channel (FC) interfaces to nonvolatile memory, use the **save fcswitch** command.

save fcswitch {*filename* **| bootconfig}**

Syntax Description

filename	The name of the file where the configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the FC configuration from the running configuration to the bootable configuration, used when the SN 5428-2 Storage Router is restarted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

Examples

The following example saves all the FC configuration information to the bootable configuration, used when the storage router is restarted:

```
[SN5428-2A]# save fcswitch bootconfig
```

The following example saves all the FC configuration information to the file named *fc_SN5428-2A*:

```
[SN5428-2A]# save fcswitch fc_SN5428-2A
```

Related Commands

Command	Description
delete fcalias	Delete the named alias or the specified alias member.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
interface fc? al-fairness	Enable the fairness algorithm on the named FC interface.
interface fc? fan-enable	Enable Fabric Address Notification (FAN) on the named FC interface.
interface fc? linkspeed	Set the transfer rate for the named FC interface.
interface fc? mfs-bundle	Enable Multi-Frame Sequence bundling for the named FC interface.
interface fc? type	Set the port type for the named FC interface.
restore fcswitch	Restore Fibre Channel configuration information from the named configuration file.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.

save scsirouter

To save all configuration data associated with the named SCSI routing instance to nonvolatile memory, use the **save scsirouter** command.

save scsirouter {*name* | **all**} {*filename* | **bootconfig**}

Syntax Description

name	The name of the SCSI routing instance.
all	Save configuration data for all SCSI routing instances.
filename	The name of the file where the configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the SCSI routing instance from the running configuration to the bootable configuration, used when the SN 5428-2 Storage Router is restarted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Maintenance
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

In a cluster environment, the SCSI routing instance can only be saved on the node that is currently running that instance.

Examples

The following example saves all SCSI routing instances currently running on this SN 5428-2 to the bootable configuration, used when the storage router is restarted:

```
[SN5428-2A]# save scsirouter all bootconfig
```

The following example saves the SCSI routing instance named *foo* to the file named *foo_SN5428-2A*:

```
[SN5428-2A]# save scsirouter foo foo_SN5428-2A
```

Related Commands

Commands	Description
delete savedconfig	Remove a saved configuration file from the storage router.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save aaa	Save the current AAA configuration information.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target maxcmdqueuedepth	Specify the maximum number of commands allowed at any given time from each iSCSI session to the specified target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show savedconfig	List the contents of the savedconfig directory or the contents of the named configuration file.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

save system

To save selected system configuration information to nonvolatile memory, use the **save system** command.

save system {*filename* **| bootconfig}**

Syntax Description

filename	The name of the file where the system configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the current running system configuration to the bootable configuration, used when the SN 5428-2 Storage Router is restarted.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

The following system configuration data is saved:

- Monitor and Administrator passwords
- Administrative contact information
- Network Time Protocol (NTP) server name
- Primary and optional secondary Domain Name Server (DNS)
- Default location for downloading storage router software
- System and cluster name
- Management and high availability (HA) interface addresses
- Static routes
- RIP settings
- SNMP settings
- CDP settings
- Restrict settings
- IP address of remote syslog host for logging
- Logging table

- Configuration information for the Gigabit Ethernet interfaces
- Management session timeout value
- Secure Shell (SSH) settings

Examples

The following example saves the current system configuration to the bootable configuration, used when the storage router is restarted:

```
[SN5428-2A]# save system bootconfig
```

The following example copies the current system configuration to the file named *sys_SN5428-2A*:

```
[SN5428-2A]# save system sys_SN5428-2A
```

Related Commands

Commands	Description
delete savedconfig	Remove a saved configuration file from the storage router.
hostname	Specify the storage router system name.
restore system	Restore selected system information from the named configuration file.
save aaa	Save the current AAA configuration information.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save vlan	Save configuration information for the named VLAN or all VLANs.
show savedconfig	List the contents of the savedconfig directory or the contents of the named configuration file.
show system	Display selected system information, including system name.

save vlan

To save VLAN and VTP configuration information for the specified VLAN or for all VLANs to nonvolatile memory, use the **save vlan** command.

save vlan {*vid* **| all} {***filename* **| bootconfig}**

Syntax Description

vid	The VLAN identification number of the VLAN configuration to be saved.
all	Save all VLANs associated with this storage router.
filename	The name of the file where the current VLAN configuration data will be written. This file is stored in the *savedconfig* directory.
bootconfig	Save the current VLAN configuration to the system's bootable configuration, to be used when the storage router is restarted. If the storage router belongs to a cluster, the saved VLAN information will automatically be propagated to other members of that cluster.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

You must save configuration data from the running configuration to the bootable configuration for it to be retained in the storage router when it is restarted. Configurations saved to a file can be moved between storage routers and can be restored at a later time.

VTP mode and domain information is saved, along with the specified VLAN configuration information.

Note In a cluster environment, VLAN management functions are handled by a single storage router. To determine which storage router is performing VLAN management functions, issue the **show cluster** command. If you issue the **save vlan** command from a storage router that is not performing VLAN management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

The following example saves the current configuration for all VLANs to the system's bootable configuration, to be used when the storage router is restarted:

```
[SN5428-2A]# save vlan all bootconfig
```

The following example saves VLAN *12* to the file named *vlanbackup*:

```
[SN5428-2A]# save vlan 12 vlanbackup
```

Related Commands

Command	Description
restore vlan	Restore VLAN configuration information from the named configuration file.
save aaa	Save current AAA configuration information.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
show savedconfig	List the contents of the *savedconfig* directory or the contents of the named configuration file.
show vlan	Display configuration and operational information for the specified VLAN or all VLANs.
show vtp	Display configuration and operational information for VTP.
vlan	Configure a non-VTP VLAN on the storage router.
vtp domain	Assign a VTP domain name to the storage router.
vtp mode	Configure the storage router to operate in client or transparent VTP mode.

scsirouter

To create a SCSI routing instance, use the **scsirouter** command.

scsirouter *name*

Syntax Description

name	The name of the SCSI routing instance created by this command. Enter a maximum of 31 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

SCSI routing is the routing of SCSI requests and responses between IP hosts in an IP network and storage devices in a Fibre Channel storage network. The SCSI routing instance becomes a binding point for the association of other configuration parameters. A SCSI routing instance provides IP hosts access to Fibre Channel storage.

There can be a maximum of 12 SCSI routing instances defined per storage router; if the storage router is a member of a cluster, no more than 12 instances can be defined across the cluster.

Note If the storage router is deployed for transparent SCSI routing, there can be only one SCSI routing instance. The SCSI routing instance is named *transparent* and is automatically created during initial system configuration.

Examples

The following command creates a SCSI routing entity named *myCompanyWebserver2*.

```
[SN5428-2A]# scsirouter myCompanyWebserver2
```

Related Commands

Command	Description
accesslist	Create an access list entity.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter authentication

To enable iSCSI authentication using the specified AAA authentication services for the named SCSI routing instance, use the **scsirouter authentication** command.

scsirouter *name* **authentication {***listname* **| default | none}**

Syntax Description

name	The name of this SCSI routing instance.
listname	Enable AAA authentication using the specified iSCSI authentication list.
default	Enable AAA authentication using the default iSCSI authentication list.
none	Disable AAA authentication for this SCSI routing instance.

Defaults

AAA authentication is disabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **scsirouter authentication** command to enable iSCSI authentication for IP hosts requesting access to storage using the named SCSI routing instance. AAA performs authentication using the services configured on the specified iSCSI authentication list. Use the **aaa authentication iscsi** command to configure the iSCSI authentication list.

Note If authentication is enabled for a SCSI routing instance using the *default* iSCSI authentication list, but no AAA authentication list is available, AAA attempts to use the "local" authentication method. If a list other than default is specified and not available, AAA authentication will fail for the SCSI routing instance.

Examples

The following example enables iSCSI authentication for the SCSI routing instance named *foo*, using the default iSCSI authentication list:

```
[SN5428-2A]# scsirouter foo authentication default
```

The following example enables iSCSI authentication of the SCSI routing instance named *foo2*, using the iSCSI authentication list named *testlab*:

```
[SN5428-2A]# scsirouter foo2 authentication testlab
```

Related Commands

Command	Description
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
username password	Add a user name and optional password to the local username database.

scsirouter cdbretrycount

To specify the number of times a failed command should be retried before returning an error on the CDB, use the **scsirouter cdbretrycount** command.

scsirouter *name* **cdbretrycount** *nn*

Syntax Description

name	The name of this SCSI routing instance.
nn	The number of CDB retries. *nn* is an integer from 0 to 512. The default value is 6. There is one second between retries.

Defaults

The number of CDB retries is 6, by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to change the number of times a failed CDB will be retried by the storage router before returning an error on the CDB. Retries occur every second. For example, with the default retry count value of 6, it would take 6 seconds before a failed command would be returned with an error.

If an intelligent storage array includes multiple paths between hosts and storage, lowering the CDB retry count value could change the triggering of failover situations.

Note In a high availability cluster, the storage router may fail over a SCSI routing instance when some or all devices accessed through that instance cannot be reached, before the maximum number of CDB retries occurs.

Examples

The following example sets the CDB retry count value to 10:

```
[SN5428-2A]# scsirouter transparent cdbretrycount 10
```

Related Commands

Command	Description
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter description

To add user-defined identification information to the named SCSI routing instance, use the **scsirouter description** command.

scsirouter *name* **description** *"user text"*

Syntax Description

name	The name of this SCSI routing instance.
"user text"	User-defined identification information associated with this SCSI routing instance. If the string contains spaces, enclose it in quotes. Enter a maximum of 64 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **scsirouter description** command allows you to add a new description or change an existing description. Descriptions are site-specific.

Examples

The following example adds the description "*Access to WebServer4 WebServer5*" to the SCSI routing instance *foo1*:

```
[SN5428-2A]# scsirouter foo1 description "Access to WebServer4 WebServer5"
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter enable

To start the named SCSI routing instance on this SN 5428-2 Storage Router, use the **scsirouter enable** command. To stop the named SCSI routing instance, use the **no** form of this command.

scsirouter {*name* **| all} enable**

no scsirouter {*name* **| all} enable**

Syntax Description

name	The name of the SCSI routing instance to be started.
all	Start all SCSI routing instances on this storage router.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

SCSI routing instances are automatically started by the storage router during the creation process, when the storage router is restarted, and when they are failed over to another storage router in a cluster. Use this command to manually control the running state of SCSI routing instances; for example, when a SCSI routing instance is restored from a saved configuration file.

SCSI routing instances that are in a stopped state are not running anywhere in the cluster. To restart a stopped SCSI routing instance, use the **scsirouter enable** command. Use the **all** keyword to start all instances on the SN 5428-2. All instances previously stopped on this storage router or available instances not running elsewhere in the cluster will start on this SN 5428-2.

The SCSI routing instance can only be started from the storage router on which it was stopped. A stopped SCSI routing instance is no longer known to any other storage router in the cluster.

Use the **scsirouter enable** command to bring a restored SCSI routing instance into the running configuration. A restored instance must be started before you can make any additional configuration changes to that instance.

Examples

The following example starts the SCSI routing instance named *foo2*. This instance must have been previously stopped.

```
[SN5428-2A]# scsirouter foo2 enable
```

The following example stops all SCSI routing instances running on the storage router:

```
[SN5428-2A]# no scsirouter all enable
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter failover

To build a list of storage routers to be used for failover purposes, use the **scsirouter failover** command.

scsirouter *name* **failover {primary | secondary}** *sysname*

Syntax Description

name	The name of the SCSI routing instance.
primary *sysname*	The name of the storage router in the cluster. In case of failure, the specified SCSI routing instance will be failed over to this storage router.
secondary *sysname*	(Optional) The name of the storage router in the cluster. If the primary storage router in the list cannot run the SCSI routing instance, it will be failed over to this storage router. **Note** Because a high availability cluster consists of two storage routers, this parameter is not used.

Defaults

None. By default, the HA failover list is not populated.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **scsirouter failover** command to build a list of storage routers that will be used during the failover process. If the specified SCSI routing instance fails over, the cluster attempts to start running the instance on the storage router designated as the *primary* in the HA failover list. If that storage router cannot run the SCSI routing instance, the cluster will attempt to start the instance on the storage router designated as the *secondary* in the HA failover list.

If there is no primary or secondary storage router on the HA failover list when the SCSI routing instance fails over, the cluster uses normal failover algorithms to determine where the SCSI routing instance should run.

The storage routers specified as primary and secondary should be active in the cluster when the command is issued. If the specified storage router is not currently active in the cluster, the setting will not take effect until the node is added to the cluster and the SCSI routing instance is restarted.

Use the **clear scsirouter failover** command to remove the current primary or secondary storage router from the HA failover list.

Note This command causes the SCSI routing instance configuration information to be saved and all nodes in the cluster to be updated.

Examples

The following example builds the HA failover list for the SCSI routing instance named *foo*. The primary storage router in the HA failover list is *SN5428-2A*.

```
[SN5428-2A]# scsirouter foo failover primary SN5428-2A
```

Related Commands

Command	Description
clear scsirouter failover	Remove the designated primary or secondary storage router from the HA failover list for the specified SCSI routing instance.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
failover scsirouter	Cause the named SCSI routing instance to cease running on the storage router.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter lun reset

To specify that "LUN reset" rather than "clear task" commands will be sent to the storage resources opened by the specified SCSI routing instance, use the **scsirouter lun reset** command.

scsirouter *name* **lun reset {yes | no}**

Syntax Description

name	The name of the SCSI routing instance. The specified SCSI routing instance must be running.
yes	Send "lun reset" to storage resources when they are opened.
no	Send "clear task" to storage resources when they are opened.

Defaults

The default is to send "clear task" commands to storage resources.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

It is preferable to send "LUN reset" commands if the device supports them. The specified SCSI routing instance must be running.

Examples

The following example enables "LUN resets" to all storage resources opened by the SCSI routing instance *foo2*:

```
[SN5428-2A]# scsirouter foo2 lun reset yes
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter reserveproxy	Enable the SCSI reserve/release commands for the specified SCSI routing instance and specify whether these commands are forwarded to the storage resource.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter password

To assign a password to a SCSI routing instance for iSCSI authentication purposes, use the **scsirouter password** command.

scsirouter *name* **password** {*password-string* | **none**}

Syntax Description

name	The name of the SCSI routing instance.
password-string	The password associated with the named SCSI routing instance. If the password is encrypted (starts with "9"), enter a maximum of 170 characters. If the password is unencrypted (starts with "0"), enter a maximum of 66 characters. If the password is entered as an unencrypted text string, enter a maximum of 64 characters.
none	Keyword, removing any existing iSCSI password assigned to the named SCSI routing instance.

Defaults

None.

Command Modes

Administrator

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to assign a password to the SCSI routing instance for two-way iSCSI authentication. Two-way iSCSI authentication allows authentication of the IP host and also allows the IP host, acting as an iSCSI initiator, to require authentication of the SCSI routing instance, acting as an iSCSI target. The user name and password assigned to the SCSI routing instance are used by the IP host for iSCSI authentication purposes.

iSCSI authentication must be enabled for the named SCSI routing instance. If iSCSI authentication is not enabled, the user name and password assigned to the SCSI routing instance will not be used.

The following rules apply to passwords:

- Passwords are entered in clear text. However, they are changed to "XXXXX" in the CLI command history cache, and are stored in the local username database in an encrypted format.
- If the password contains embedded spaces, enclose it with single or double quotes.
- After initial entry, passwords display in their encrypted format. Use the **show scsirouter** command to display the SCSI routing instance authentication information. The following is an example display:

```
SCSI Router Authentication Information
Router     Authentication  Username       Password
---------- --------------- -------------- --------
zeus       web1            zeus_lab1      9 ea9bb0c57ca4806d3555f3f78a4204177a
```

The initial "9" in the example display indicates that the password is encrypted.

- You can re-enter an encrypted password using the normal **scsirouter password** command. Enter the encrypted password in single or double quotes, starting with 9 and a single space. For example, copying and pasting *password "9 ea9bb0c57ca4806d3555f3f78a4204177a"* from the example above into the **scsirouter mars password** command would assign the SCSI routing instance *mars* the same iSCSI password as the SCSI routing instance *zeus*. This functionality allows passwords to be restored from saved configuration files.
- When entering a password, a zero followed by a single space indicates that the following string is not encrypted; 9 followed by a single space indicates that the following string is encrypted. To enter a password that starts with 9 or zero, followed by one or more spaces, enter a zero and a space and then enter the password string. For example, to enter the password "*0 123*" for the SCSI routing instance *zeus*, enter this command:

  ```
  scsirouter zeus password "0 0 123"
  ```

  To enter the password "*9 73Zjm 5*" for SCSI routing instance *lab3*, use this command:

  ```
  scsirouter lab3 password '0 9 73Zjm 5'
  ```

Examples

The following example enables iSCSI authentication, using the default authentication list, for the SCSI routing instance named *lab3* and assigns a user name of *lab3-admin* and a password of *testing* to the instance for two-way authentication:

```
[SN5428-2A]# scsirouter lab3 authentication default
*[SN5428-2A]# scsirouter lab3 username lab3-admin
*[SN5428-2A]# scsirouter lab3 password testing
```

Related Commands

Command	Description
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
scsirouter username	Assign a user name to a SCSI routing instance for iSCSI authentication purposes.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter primary

To assign the specified system as the preferred storage router for the named SCSI routing instance, use the **scsirouter primary** command.

scsirouter *name* **primary** *sysname*

Syntax Description

name	The name of this SCSI routing instance.
primary *sysname*	The system name of the preferred storage router.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

At any given time, a SCSI routing instance can run on only one node in a cluster. If a SCSI routing instance has the **primary** attribute set, the specified storage router will take over running that instance upon system restart or whenever target and critical resources are available.

If the **primary** attribute is not set, the SCSI routing instance continues running on the node where it was started until it is explicitly stopped (via a **no scsirouter enable** command), it automatically fails over to another node in the cluster because targets or critical resources are unavailable, or an explicit **failover scsirouter** command is issued. This is the default behavior.

Use the **scsirouter primary** command if you always want the specified SCSI routing instance to run on a specific storage router in a cluster whenever that node is available (assuming target and critical resources are available). Use the **clear scsirouter primary** command to remove the currently configured primary value for the named SCSI routing instance.

Note Setting the **primary** attribute saves the SCSI routing instance configuration and circulates those changes to the high availability cluster. If the specified storage router is available to the cluster and has all target and critical resources available, the SCSI routing instance will be immediately failed over. If the specified storage router is not available to the cluster, failover will occur as soon as that storage router becomes available to the cluster (assuming target and critical resources are available).

See Chapter 10, “Configuring a High Availability Cluster,” and Chapter 11, “Maintaining and Managing the SN 5428-2 Storage Router,” for more information about HA, cluster configuration, and managing SCSI routing instances in a cluster environment.

Examples

The following command designates the SN 5428-2 *LabRouter1* as the storage router on which the SCSI routing instance named *foo* will always, under normal conditions, run.

```
[SN5428-2A]# scsirouter foo primary LabRouter1
```

Related Commands

Command	Description
clear scsirouter primary	Remove the storage router configured as the primary for the named SCSI routing instance.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter failover	Add the storage router to the HA failover list for the specified SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter reserveproxy

To configure the SCSI routing instance to track SCSI reserve/release commands and to specify whether these commands are forwarded to the storage target, use the **scsirouter reserveproxy** command.

scsirouter *name* **reserveproxy {enable passthru {yes | no} | disable}**

Syntax Description

name	The name of the SCSI routing instance.
enable passthru yes	Configure the SCSI routing instance to track SCSI reserve and release commands and enable forwarding of these commands to storage resources.
enable passthru no	Configure the SCSI routing instance to track SCSI reserve and release commands but disable forwarding of these commands to storage resources.
disable	Disable the reserve proxy feature for the named SCSI routing instance. The storage router does not track the SCSI reserve and release commands, which are sent from the IP host. The IP host manages the SCSI reserve and release commands.

Defaults

Reserve-proxy passthru is disabled.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The SCSI reserve/release command allows an initiator to reserve the storage for its own use. Attempts to access the storage from other initiators are rejected until the first initiator releases the storage. If the reserve proxy feature is enabled using the **scsirouter reserveproxy** command, the storage router keeps track of the reserved status of target LUNs and returns the appropriate SCSI command status to other initiators that issue SCSI commands to that target LUN.

If passthru is enabled, the storage router forwards the SCSI reserve and release commands to the device. If passthru is not enabled, the SCSI reserve and release commands are not forwarded, but the storage router will respond as if the commands had been forwarded.

Note This functionality does not apply to operating systems (such as Windows NT) which do not utilize the SCSI Reserve command.

Examples

The following example configures the SCSI routing instance *foo2* to track SCSI reserve and release commands and enables forwarding of these commands to storage resources:

```
[SN5428-2A]# scsirouter foo2 reserveproxy enable passthru yes
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter failover	Add the storage router to the HA failover list for the specified SCSI routing instance.
scsirouter lun reset	Configure the named SCSI routing instance to send a “LUN reset” command when opening all targets.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter serverif

To assign a Gigabit Ethernet interface and IP address to the named SCSI routing instance, use the **scsirouter serverif** command. The specified interface allows IP hosts access to Fibre Channel storage.

scsirouter *name* **serverif** *ge?* **{***A.B.C.D/bits* **|** *A.B.C.D/1.2.3.4***} [secondary** *ge?***]**

scsirouter *name* **serverif** *ge?* **vlan** *vid* **{***A.B.C.D/bits* **|** *A.B.C.D/1.2.3.4***} [secondary** *ge?***]**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the Gigabit Ethernet interface.
serverif *ge?*	The name of the interface. When you type the **scsirouter serverif** command, followed by **?**, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
A.B.C.D/bits	The IP address of the named interface. If the keyword **vlan** is used, the IP address is part of the specified VLAN. *A.B.C.D* is the dotted quad notation of the IP address. The */bits* specifies the subnet mask in CIDR style. **Note** The IP address must be on a unique subnet; you cannot configure an IP address that is on the same subnet as another storage router network interface.
A.B.C.D/1.2.3.4	The IP address of the named interface. If the keyword **vlan** is used, the IP address is part of the specified VLAN. *A.B.C.D* is the dotted quad notation of the IP address. *1.2.3.4* is the dotted quad notation of the subnet mask. **Note** The IP address must be on a unique subnet; you cannot configure an IP address that is on the same subnet as another storage router network interface.
secondary *ge?*	(Optional) The name of the Gigabit Ethernet interface to be used as a secondary interface for the specified IP address. If the primary interface goes down and remains down for two seconds, the specified IP address will be moved to the secondary interface.
vlan *vid*	The keyword and the VLAN identifier.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The specified interface IP address is configured on IP hosts requiring access to storage resources through the SN 5428-2 Storage Router.

Each SCSI routing instance requires two active elements:

- The *serverif* element assigns an interface and IP address for use by IP hosts requiring access to storage resources. The instance becomes active when this interface is added. A SCSI routing instance can have multiple *serverif* elements; one IP address per logical interface can be configured for a SCSI routing instance.
- The *target* element is a complex item that specifies the mapping between LUNs on the storage devices and the host systems.

The **scsirouter serverif vlan** command is used to associate a VLAN with a SCSI routing instance. All traffic using the specified Gigabit Ethernet interface will be considered as part of the VLAN; all IP hosts accessing storage through the SN 5428-2 using the specified Gigabit Ethernet interface IP address must connect as part of the specified VLAN.

When the SCSI routing instance is started, a logical interface (for example, ge2VLAN100) is created, which incorporates the physical interface and the VID. This logical interface can be displayed via the **show interface** command.

If the **secondary** keyword is used, both Gigabit Ethernet interfaces must be connected to the same network segment. If the primary interface goes down and remains down for two seconds, the IP address will be moved to the secondary interface.

Note If you configure a Gigabit Ethernet IP address with a secondary interface, all Gigabit Ethernet IP addresses on the same subnet must also be configured with the same secondary interface.

Examples

The following command adds the Gigabit Ethernet interface *ge1*, with the IP address 10.1.10.128/24, to the SCSI routing instance named *foo2*.

```
[SN5428-2A]# scsirouter foo2 serverif ge1 10.1.10.128/24
```

The following command adds the Gigabit Ethernet interface *ge2* and VLAN ID *45,* with IP address 10.1.30.128/24, to the SCSI routing instance *fooA*. If the primary interface is not available, the IP address will be moved to the secondary Gigabit Ethernet interface, *ge1*. The Gigabit Ethernet interfaces must be connected to the same network.

```
[SN5428-2A]# scsirouter fooA serverif ge2 vlan 45 10.1.30.128/24 secondary ge1
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
setup scsi	Run the wizard to configure a SCSI routing instance.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter slp enable

To enable the advertisement of the targets of the named SCSI routing instance with the Service Location Protocol (SLP) service, use the **scsirouter slp enable** command. To disable target advertisement, use the **no** form of this command.

scsirouter *name* **slp enable**

no scsirouter *name* **slp enable**

Syntax Description

name	Name of the SCSI routing instance. All targets associated with this SCSI routing instance are advertised with the SLP service.

Defaults

Advertising with the SLP Service is enabled for all targets.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

SLP is an IP protocol designed to make it easy for network clients to discover available services on a network and to learn about the configuration of those services. By default, SLP advertisement is enabled when:

- A SCSI routing instance is started by the storage router during the creation process.
- The storage router is restarted.
- A SCSI routing instance is failed over to another storage router in a cluster.

Use this command to manually disable and re-enable the advertisement of targets with the SLP service. When target advertisement is disabled, all existing targets for the specified SCSI routing instance are de-registered, and any new targets that are added will not be advertised.

Examples

The following example disables target advertisement for the SCSI routing instance named *foo* and deregisters all of its previously registered targets from the SLP service:

```
[SN5428-2A]# no scsirouter foo slp enable
```

The following example re-enables target advertisement for the SCSI routing instance named *foo*:

```
[SN5428-2A]# scsirouter foo slp enable
```

Related Commands

Command	Description
show slp	Display the status of the SLP service and the interface address where the SLP service is listening for incoming SLP service requests.
slp findattrs	Discover the attributes of a specific SLP registered service.
slp findsrvs	Locate a SLP registered service of a specific type on the local subnet.
slp findsrvtypes	Discover all SLP registered service types on the local subnet.

scsirouter target accesslist

To associate the named access list with the specified target, use the **scsirouter target accesslist** command.

scsirouter *name* **target {***name* **| all} accesslist {***name* **| any | none} [ro | rw]**

Syntax Description

name	The name of the SCSI routing instance to which this target belongs.
target *name*	The name of the storage target to associate with this access list. The target must already exist.
target all	Associate all targets with the named access list.
accesslist *name*	The name of the access list to associate with this storage target.
accesslist any	Allow connections and logins for the specified target from any IP host. This is effectively "open access."
accesslist none	Prevent any new connections or logins to this target from any IP hosts. This is effectively "no access."
ro	(Optional) Allow the IP hosts identified by the specified access list read-only device access.
rw	(Optional) Allow the IP hosts identified by the specified access list read/write device access. This is the default.

Defaults

If access type (read-only or read/write) is not specified, the default is read/write.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An access list identifies the IP hosts allowed to access the associated storage target through the SN 5428-2 Storage Router. IP hosts can be identified by IP address, CHAP user name, or iSCSI Name. Access lists are associated with specific storage targets. Each target can be associated with one access list that provides IP hosts read/write device access and one access list that provides read-only device access.

When an IP host attempts to access a storage resource, the storage router first looks for a matching entry using the access list configured to allow read/write device access. If the IP host does not have a matching entry in the read/write access list, the access list configured for read-only device access (if any) is used. If the IP host does not have a matching entry on either access list, the IP host is denied access to the storage resource.

Note Some host operating systems impose restrictions on the use of read-only access lists. For details, see the readme files and *Release Notes for Cisco iSCSI Driver* for your IP host operating system.

- Use the **target all** form of this command to create an association between the specified access list and all targets.
- Use the reserved access list name **none** to remove any access list associations for the specified target. This effectively prevents access to this storage target from any IP host.
- Use the reserved access list name **any** to allow access to this storage target from any IP host.This is effectively "open access."
- Existing connections and logins are not affected by an access list change. However, if there are existing connections, the storage router issues a warning message with that information in response to this command.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Examples

The following example creates an association between the storage target *webserver4* (accessed via SCSI routing instance *foo*) and the access list *webserver2*. By default, the IP hosts identified by the *webserver2* access list will be allowed read/write device access to the target.

```
[SN5428-2A]# scsirouter foo target webserver4 accesslist webserver2
```

The following example provides the IP hosts identified in the access list named *media* read-only access to all targets accessed via SCSI routing instance *LabA*:

```
[SN5428-2A]# scsirouter LabA target all accesslist media ro
```

Note Some host operating systems impose restrictions on the use of read-only access lists. For details, see the readme files and *Release Notes for Cisco iSCSI Driver* for your IP host operating system.

The following example provides the IP hosts identified by the access list *webcheck* read-only device access, and provides the IP hosts identified by access list *webserver2* read/write device access, to the target *webserver3*:

```
[SN5428-2A]# scsirouter foo target webserver3 accesslist webcheck ro
Setting read-only accesslist to 'webcheck' for scsirouter 'foo' target 'webserver3
*[SN5428-2A]# scsirouter foo target webserver3 accesslist webserver2 rw
Setting read-write accesslist to 'webserver2' for scsirouter 'foo' target 'webserver3
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target crc	Control the usage of iSCSI cyclical redundancy check (CRC) on the specified target or all targets.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target crc

To control the usage of iSCSI cyclical redundancy check (CRC) on the specified target or all targets, use the **scsirouter target crc** command.

scsirouter *name* **target {***name* **| all} crc {always | any | never | prefer-off | prefer-on}**

Syntax Description

name	The name of the SCSI routing instance to which this target belongs.
target *name*	The name of the storage target.
target all	Apply the specified iSCSI CRC usage to all targets associated with this SCSI routing instance.
always	Always force iSCSI CRC on the target.
any	The target supports both CRC and non-CRC modes. The use of CRC is negotiated to the initiator preference.
never	The use of iSCSI CRC is disabled on this target.
prefer-off	The use of iSCSI CRC is not the preferred mode of operation for this target, but the target will negotiate the mode if CRC mode is the only mode supported by the initiator. This is the default setting.
prefer-on	The use of iSCSI CRC is the preferred mode of operation for this target, but the target will function in non-CRC mode if it is the only mode supported by the initiator.

Defaults

iSCSI CRC is not the preferred mode of operation for the target.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

CRC codes are shortened cyclic codes used for error detection. A target configured for iSCSI CRC as the preferred mode of operation (prefer-on) opts for data integrity over performance. A target configured for non-CRC mode as the preferred mode of operation (prefer-off) opts for performance over data integrity.

Depending on the initiator and target configurations, the usage of iSCSI CRC is negotiated. Table 12-19 lists the CRC negotiation outcomes for each possible pair of CRC configurations.

Table 12-19 iSCSI CRC Negotiation Outcomes

Initiator CRC Mode	Target CRC Mode	CRC Negotiation Outcome
always	always	CRC is enabled.
	never	Negotiation is rejected. No session is established to the target.
	prefer-on	CRC is enabled.
	prefer-off	CRC is enabled.
	any	CRC is enabled.
never	always	Negotiation is rejected. No session is established to the target.
	never	CRC is disabled.
	prefer-on	CRC is disabled.
	prefer-off	CRC is disabled.
	any	CRC is disabled.
prefer-on	always	CRC is enabled.
	never	CRC is disabled.
	prefer-on	CRC is enabled.
	prefer-off	CRC is disabled.
	any	CRC is enabled.
prefer-off	always	CRC is enabled.
	never	CRC is disabled.
	prefer-on	CRC is enabled.
	prefer-off	CRC is disabled.
	any	CRC is disabled.

Examples

The following example configures the storage target *webserver4*, accessed through SCSI routing instanced *foo*, to always use iSCSI CRC:

```
[SN 5428-2A}# scsirouter foo target webserver4 crc always
```

The following example configures all storage targets accessed through SCSI routing instances *lab2*, to prefer the use of iSCSI CRC:

```
[SN 5428-2A}# scsirouter lab2 target all crc prefer-on
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
scsirouter target enable	Allow or disallow connections and logins for the named target.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target description

To add a description to the named target, use the **scsirouter target description** command.

scsirouter *name* **target** *name* **description** *"user text"*

Syntax Description

name	The name of the SCSI routing instance to which this target belongs.
target *name*	The name of the storage target.
"user text"	User-defined identification information associated with this storage target. If the description contains spaces, enclose the string in quotes. Enter a maximum of 64 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Target description information is an optional attribute of a SCSI routing instance. Use the **show scsirouter** command to display target description information.

Examples

The following example adds a description to the storage target *webserver4*, accessed through the SCSI routing instance *foo*:

```
[SN5428-2A]# scsirouter foo target webserver4 description "Web databases"
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target enable

To allow connections and logins for the named target, use the **scsirouter target enable** command. To disallow connections and logins for the named target, use the **no** form of this command.

scsirouter *name* **target** {*name* | **all**} **enable**

no scsirouter *name* **target** {*name* | **all**} **enable**

Syntax Description

name	The name of the SCSI routing instance to which this target belongs.
target *name*	The name of the storage target.
target all	Allow connections for all targets of this SCSI routing instance to be enabled or disabled.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

When you add a target to a SCSI routing instance, it is by default enabled. However, no access list is associated with the target, thus effectively preventing any access to the storage target from any IP hosts. When you associate an access list with a target, the specified connections and logins are allowed.

Use this command to control access without changing the target access list association.

Existing connections and logins are not affected by the **no** form of this command, but future connections and logins are not allowed. If existing IP hosts are connected, the storage router issues a warning message with that information in response to this command.

Use the reserved target name **all** to enable or disable connections for all targets of this SCSI routing instance.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Examples

The following example enables connections for all targets of the SCSI routing instance *foo*.

```
[SN5428-2A]# scsirouter foo target all enable
```

The following examples disables connections for the target *webservices2* of the SCSI routing instance named *lab2*:

```
[SN5428-2A]# no scsirouter lab2 target webservices2 enable
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
scsirouter target maxcmdqueuedepth	Specify the maximum number of commands allowed at any given time from each iSCSI session to the specified target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target {lunid | serial | wwpn} #?

To use an index method of mapping a logical target or a logical target and LUN combination to storage, use the **scsirouter target {serial | lunid | wwpn} #?** command. This command creates an indexed list of storage resources, assigning a unique index number to each LUN available. Specify the storage resources to map by using the appropriate index numbers.

scsirouter *name* **target** *name* **wwpn #?**

scsirouter *name* **target** *name* **[lun** *nn*] **wwpn #?**

scsirouter *name* **target** *name* **lun** *nn* **{serial | lunid} #?**

scsirouter *name* **target** *name* **wwpn #***nn* **[wwpn** *#nn*]

scsirouter *name* **target** *name* **lun** *nn* **wwpn #***nn* **[wwpn** *#nn*] **[force]**

scsirouter *name* **target** *name* **lun** *nn* **{serial | lunid}** *#nn* **[force]**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the storage target.
target *name*	A user-specified name of the logical target. Enter a maximum of 31 characters or a valid iSCSI Name. There is a maximum of 100 targets per storage router or per high availability cluster.
lun *nn*	The LUN number associated with the logical target. The LUN number is optional if mapping to a World Wide Port Name (WWPN) address type. The LUN number is required if mapping to a serial number or LUN identifier.
#?	Request an indexed list of storage resources available on the Fibre Channel (FC) network.
serial	Use the serial number for the named storage resource. The storage resource must support unique serial numbers for each LUN.
wwpn	Use the World Wide Port Name (WWPN) address type for the named storage resource. You can specify a primary and optional secondary WWPN.
lunid	Use the unique LUN identifier, assigned when the LUN is discovered by the FC interface.
#*nn*	The index number from the displayed list. The storage resource listed after the number specified is the physical storage address to which the logical target or logical target and LUN combination is to be mapped.
force	(Optional) Keyword used to allow LUN-mapping of the same storage array control LUNs in multiple targets.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command can be used for target-only or target-and-LUN mapping.

When you map a target using WWPN and the target needs to be accessed in a high availability cluster, you must specify both the primary WWPN (the WWPN of the storage resource as known to the first storage router in the cluster) and the secondary WWPN (the WWPN of the storage resource as known to the second storage router in the cluster).

To display the indexed list of storage resources, use the number sign (#) character followed by a question mark (?). That action will cause a list of devices discovered on the FC network to display as a numbered (indexed) table. The original command is re-displayed at the prompt below the list to the point of the **#** keyword. Complete the command by entering the appropriate index number.

When a target is added, it is by default enabled. However, it is not associated with any access list ("accesslist none"), effectively disabling access to the target from any IP hosts. Use the **scsirouter target accesslist** command to enable access to this storage target for selected IP hosts. See Chapter 6, "Configuring SCSI Routing," for more information about configuring SCSI routing on the SN 5428-2 Storage Router.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Use the **force** keyword to allow target-and-LUN mapping of the same storage array control LUN in multiple targets. Do not use the **force** keyword to LUN-map the same data LUN in multiple targets. LUN-mapping of the same LUN in multiple targets is advised for a control LUN on a storage controller only.

Examples

The following example displays an indexed list of storage resources available to SCSI routing instance *lab2* and maps the logical target *webserver8* to the WWPN storage address represented by index number 2.

```
[SN5428-2A]# scsirouter lab2 target webserver8 wwpn #?

                                Device
Id  I/F   WWPN             Lun   Type   Vendor   Product
--- ----- --- ---------------- ----- ------ -------- ----------------
1   fc1   2200001026448a0d 0     Disk   SEAGATE  ST217340FC
2   fc1   22000003be3203bc 0     Disk   SEAGATE  ST217341FC

*[SN5428-2A]# scsirouter lab2 target webserver8 wwpn #2
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
scsirouter target enable	Allow or disallow connections and logins for the named target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target lun lunid

To map a logical target and LUN combination to a unique LUN identifier, use the **scsirouter target lun lunid** command. The **scsirouter target lun lunid** command is a target-and-LUN mapping method of mapping a logical target to storage.

scsirouter *name* **target** *name* **lun** *nn* **lunid** *lun-identifier* **[force]**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the storage target.
target *name*	A user-specified name of the logical target. Enter a maximum of 31 characters or a valid iSCSI Name. There is a maximum of 100 targets per storage router or per high availability cluster.
lun *nn*	The LUN number associated with the logical target. LUNs are integers between 0 and 255.
lunid *lun-identifier*	Use the unique LUN identifier, assigned when the LUN is discovered by the Fibre Channel interface. Enter either 16 or 32 hex digits.
force	(Optional) Keyword used to allow LUN-mapping of the same storage array control LUNs in multiple targets.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **scsirouter target lun lunid** command specifies a logical target name and LUN number combination to be mapped to a physical LUN by its unique LUN identifier. The LUN identifier is represented by 16 or 32 hex digits. The digits may be separated by colons.

When a target is added, it is by default enabled. However, it is not associated with any access list ("accesslist none"), effectively disabling access to the target from any IP hosts. Use the **scsirouter target accesslist** command to enable access to this storage target for selected IP hosts.

See Chapter 6, "Configuring SCSI Routing," for more information about configuring SCSI routing instances on the SN 5428-2 Storage Router.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Use the **force** keyword to allow mapping of the same storage array control LUN in multiple targets. Do not use the **force** keyword to LUN-map the same data LUN in multiple targets. LUN-mapping of the same LUN in multiple targets is advised for a control LUN on a storage controller only.

Examples

The following example maps a logical target and LUN combination for SCSI router instance *foo*. The logical target and LUN combination, *webserver5* LUN *5*, is mapped to the physical LUN represented by the LUN identifier *200000203719129d*.

```
[SN5428-2A]# scsirouter foo target webserver5 lun 5 lunid 200000203719129d
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
scsirouter target enable	Allow or disallow connections and logins for the named target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target lun serial

To map a logical target and LUN combination to the serial number of the physical LUN, use the **scsirouter target lun serial** command. The **scsirouter target lun serial** command is a target-and-LUN mapping method of mapping a logical target and LUN combination to a physical storage resource by the LUN serial number.

scsirouter *name* **target** *name* **lun** *nn* **serial** *serial_number* **[force]**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the storage target.
target *name*	A user-specified name of the logical target. Enter a maximum of 31 characters or a valid iSCSI Name. There is a maximum of 100 targets per storage router or per high availability cluster.
lun *nn*	The LUN number associated with the **target** (the iSCSI LUN). iSCSI LUNs are integers between 0 and 255.
serial *serial_number*	The serial number of the physical LUN. The storage resource must support unique serial numbers for each LUN.
force	(Optional) Keyword used to allow LUN-mapping of the same storage array control LUNs in multiple targets.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **scsirouter target lun serial** command requires both a logical target and LUN combination and the serial number of the physical LUN.

When a target is added, it is by default enabled. However, it is not associated with any access list ("accesslist none"), effectively disabling access to the target from any IP hosts. Use the **scsirouter target accesslist** command to enable access to this storage target for selected IP hosts.

See Chapter 6, "Configuring SCSI Routing," for more information about configuring SCSI routing instances on the SN 5428-2 Storage Router.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Use the **force** keyword to allow mapping of the same storage array control LUN in multiple targets. Do not use the **force** keyword to LUN-map the same data LUN in multiple targets. LUN-mapping of the same LUN in multiple targets is advised for a control LUN on a storage controller only.

Examples

The following example maps the logical target and LUN combination for SCSI routing instance *lab2*. The logical target and LUN combination, *webserver9* LUN *1*, is mapped to the physical LUN with a serial number of *ST318451FC3CC05T3N00007116DLWQ*.

```
[SN5428-2A]# scsirouter lab2 target webserver9 lun 1 serial ST318451FC3CC05T3N00007116DLWQ
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
scsirouter target enable	Allow or disallow connections and logins for the named target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target lun wwpn lun

To map a logical target and LUN combination to a primary (and optional secondary) storage address where each storage address is specified by World Wide Port Name (WWPN) and LUN, use the **scsirouter target lun wwpn lun** command. The **scsirouter target lun wwpn lun** command is a target-and-LUN mapping method of mapping a logical target to storage.

scsirouter *name* **target** *name* **lun** *nn* **wwpn** *xxxxxxxxxxxxxxx* **lun** *nn*
[wwpn *xxxxxxxxxxxxxxx* **lun** *nn***] [force]**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the storage target.
target *name*	A user-specified name of the logical target. Enter a maximum of 31 characters or a valid iSCSI Name. There is a maximum of 100 targets per storage router or per high-availability cluster.
lun *nn*	The first instance is the LUN number associated with the **target** (the iSCSI LUN). iSCSI LUNs are integers between 0 and 255. The second instance is the LUN number associated with the primary WWPN (physical device LUN). Physical LUNs may be any physical device number, for example 0x51d1 or 123.
wwpn *xxxxxxxxxxxxxxx*	Specify a WWPN for the primary storage address. In a high availability cluster, this is the WWPN for the storage resource as known to the first storage router in the cluster.
wwpn *xxxxxxxxxxxxxxx*	(Optional) Specify a WWPN for the secondary storage address, used as an alternate for mapping if the primary is not available. In a high availability cluster, this is the WWPN for the storage resource as known to the second storage router in the cluster.
lun *nn*	(Optional) Specify the LUN associated with the optional secondary WWPN. Physical LUNs may be any physical device number, for example 0x51d1 or 123.
force	(Optional) Keyword used to allow LUN-mapping of the same storage array control LUNs in multiple targets.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **scsirouter target lun wwpn lun** command specifies a logical target name and LUN number combination to be mapped to a physical WWPN and LUN combination in storage.

Tips WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When entering WWPN addresses, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character. The entry should be zero-filled from the most significant (the left-most) character position.

The following examples are *correct*:

- 0000:0000:1234:5678
- 0A0F2860:02111750
- 0A0F286002111750

The following examples are *incorrect*:

- 1:234:567:8:91:23:FF:6
- 12:34:56

The secondary WWPN and LUN combination is optional. The secondary combination is mapped to the logical target name and LUN combination as an alternate, if the primary WWPN and LUN combination is not available.

When you map a target using WWPN and the target needs to be accessed in a high availability cluster, you must specify both the primary WWPN (the WWPN of the storage resource as known to the first storage router in the cluster) and the secondary WWPN (the WWPN of the storage resource as known to the second storage router in the cluster). The secondary WWPN value may need to be retrieved by issuing the appropriate commands (such as the **show devices** command) from the second node in the cluster, or by temporarily attaching the secondary port of the storage device to the first storage router.

When a target is added, it is by default enabled. However, it is not associated with any access list ("accesslist none"), effectively disabling access to the target from any IP hosts. Use the **scsirouter target accesslist** command to enable access to this storage target for selected IP hosts.

See Chapter 6, "Configuring SCSI Routing," for more information about configuring SCSI routing instances on the SN 5428-2 Storage Router.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Use the **force** keyword to allow mapping of the same storage array control LUN in multiple targets. Do not use the **force** keyword to LUN-map the same data LUN in multiple targets. LUN-mapping of the same LUN in multiple targets is advised for a control LUN on a storage controller only.

Examples

The following example maps a logical target and LUN combination for SCSI router instance *lab3*. The logical target and LUN combination, *webserver7* LUN *7*, is mapped to the primary WWPN and LUN combination, *2200002037191505* LUN *0*.

```
[SN5428-2A]# scsirouter lab3 target webserver7 lun 7 wwpn 2200002037191505 lun 0
```

The following example maps a logical target and LUN combination to a primary and secondary WWPN. You may need to obtain the secondary WWPN from the storage router to which the secondary port of the device is attached, or temporarily attach the storage device's secondary port to the storage router being configured.

```
[SN5428-2A]# scsirouter lab4 target webserver8 lun 0 wwpn 2200002037c6756d lun 0 wwpn
2100002037c6747f lun 0
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
scsirouter target enable	Allow or disallow connections and logins for the named target.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target maxcmdqueuedepth

To specify the maximum number of commands allowed at any given time from each iSCSI session to the specified target, use the **scsirouter target maxcmdqueuedepth** command.

scsirouter *name* **target {all |** *name***} maxcmdqueuedepth** *nn*

Syntax Description

name	Name of the SCSI routing instance.
target all	Specify the maximum number of command for all targets.
target *name*	The name of the storage target.
nn	The maximum number of commands allowed from each iSCSI session. If the value is set to zero, the feature is disabled.

Defaults

This feature is disabled; **maxcmdqueuedepth** is set to zero.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

When this value is configured, all current and future iSCSI sessions to the specified target will enforce the maximum command queue depth. To disable this feature, and allow an unlimited number of commands to the target from each iSCSI session, set the **maxcmdqueuedepth** to zero. This is the default setting.

Use the **show scsirouter** command with the **bootconfig** or **runningconfig** keyword to display the current maximum command queue depth value.

Note Normal limitations, based on the available command buffer space, are always enforced. Setting the maximum command queue depth does not override these normal limitations.

Examples

The following example sets the maximum command queue depth to 20, for all targets associated with the SCSI routing instance named *foo*.

```
[SN5428-2A]# scsirouter foo target all maxcmdqueuedepth 20
```

The following example disables the maximum command queue depth, allowing an unlimited number of commands to the target named *webservices2*, associated with the SCSI routing instance named *foo*.

```
[SN5428-2A]# scsirouter foo target webservices2 maxcmdqueuedepth 0
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter target enable	Allow or disallow connections and logins for the named target.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target profile

To disable the use of an initial iSCSI Ready-to-Transfer (R2T) on connections coming to this target, use the **scsirouter target profile** command.

scsirouter *name* **target** *name* **profile {high | low}**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the target profile.
target *name*	The name of the storage target.
high	Disable the use of R2T for the specified target. This allows a host that opens a connection to the specified target to start sending data of a certain length as if it had received an initial R2T.
low	Enable the use of R2T for the specified target. This prevents a host that opens a connection to the specified target from sending any data packets to the target until the target has sent the host an R2T message. This adds latency to data transfer activities to this target.

Defaults

All targets are configured as high profile targets.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The SN 5428-2 Storage Router supports up to 16 concurrent connections that do not use an initial R2T. If there are 16 existing connections to targets configured as high profile, the 17th connection will be handled as though the target were defined as low profile, causing the connection performance to be a bit slower.

By default, all targets are defined as high profile targets to provide the best performance. Use the **scsirouter target profile** command to configure targets that do not require the additional performance as low profile targets.

Examples

The following example configures the target *labserver8* for SCSI routing instance *lab4* as a low profile target. Any host opening a connection to the *labserver8* target cannot send any data to the target until the target sends the host an R2T.

```
[SN5428-2A]# scsirouter lab4 target labserver8 profile low
```

Related Commands

Command	Description
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter target enable	Allow or disallow connections and logins for the named target.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter target wwpn

To map a logical target to a primary (and, optionally, a secondary) storage address specified by World Wide Port Names (WWPNs), use the **scsirouter target wwpn** command. The **scsirouter target wwpn** command is a target-only method of mapping a logical target specified by WWPNs.

scsirouter *name* **target** *name* **wwpn** *xxxxxxxxxxxxxxx* **[wwpn** *xxxxxxxxxxxxxxx***]**

Syntax Description

name	Name of the SCSI routing instance to which you are adding the storage target.
target *name*	A user-specified name of the logical target. Enter a maximum of 31 characters or a valid iSCSI Name. There is a maximum of 100 targets per storage router or per high availability cluster.
wwpn *xxxxxxxxxxxxxxx*	Specify a WWPN for the primary storage address. In a high availability cluster, this is the WWPN for the storage resource as known to the first storage router in the cluster.
wwpn *xxxxxxxxxxxxxxx*	(Optional) Specify a WWPN for the secondary storage address, used as an alternate for mapping if the primary is not available. In a high availability cluster, this is the WWPN for the storage resource as known to the second storage router in the cluster.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **scsirouter target wwpn** command requires only a logical target name to be mapped to a physical target address—no LUNS are specified. However, all LUNs that are part of the physical target address are discovered and made apparent as LUNs belonging to the logical target.

Tips

WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When entering WWPN addresses, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character. The entry should be zero-filled from the most significant (the left-most) character position.

The following examples are *correct*:

- 0000:0000:1234:5678
- 0A0F2860:02111750
- 0A0F286002111750

The following examples are *incorrect*:

- 1:234:567:8:91:23:FF:6
- 12:34:56

When you map a target using WWPN and the target needs to be accessed in a high availability cluster, you must specify both the primary WWPN (the WWPN of the storage resource as known to the first storage router in the cluster) and the secondary WWPN (the WWPN of the storage resource as known to the second storage router in the cluster). The secondary WWPN value may need to be retrieved by issuing the appropriate commands (such as the **show devices** command) from the second node in the cluster, or by temporarily attaching the secondary port of the storage device to the first storage router.

When a target is added, it is by default enabled. However, it is not associated with any access list ("accesslist none"), effectively disabling access to the target from any IP hosts. Use the **scsirouter target accesslist** command to enable access to this storage target for selected IP hosts.

See Chapter 6, "Configuring SCSI Routing," for more information about configuring SCSI routing instances on the SN 5428-2 Storage Router.

Note When making changes to SCSI routing instances (such as adding or deleting targets or changing access) be sure to make the complimentary changes to the iSCSI configuration of IP hosts using these services to access the storage resources. See the readme files for the appropriate iSCSI drivers for additional details. You can access the latest iSCSI drivers and readme and example configuration files from Cisco.com.

Examples

The following example maps a logical target for SCSI router instance *lab4*. The logical target *webserver1* is mapped to the primary WWPN, *22:00:00:20:37:19:15:05*.

```
[SN5428-2A]# scsirouter lab4 target webserver1 wwpn 22:00:00:20:37:19:15:05
```

The following example maps a logical target to a primary and secondary WWPN. You may need to obtain the secondary WWPN from the storage router to which the secondary port of the device is attached, or temporarily attach the storage device's secondary port to the storage router being configured.

```
[SN5428-2A]# scsirouter lab5 target webserver9 wwpn 2200002037c6756d wwpn 2100002037c6747f
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
scsirouter	Create a SCSI routing instance.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter primary	Identify a storage router as the preferred storage router to run the named SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.
setup scsi	Run the wizard to configure a SCSI routing instance.
show accesslist	Display the contents of the named access list or all access lists.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

scsirouter username

To assign a user name to a SCSI routing instance for iSCSI authentication purposes, use the **scsirouter username** command.

scsirouter *name* **username** {*user-name* | **none**}

Syntax Description

name	The name of the SCSI routing instance.
user-name	A valid user name. Enter a maximum of 63 characters
none	Keyword, removing any existing iSCSI user name assigned to the named SCSI routing instance.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to assign a user name to the SCSI routing instance for two-way iSCSI authentication. Two way iSCSI authentication allows authentication of the IP host and also allows the IP host, acting as an iSCSI initiator, to require authentication of the SCSI routing instance, acting as an iSCSI target. The user name and password assigned to the SCSI routing instance are used by the IP host for iSCSI authentication purposes.

iSCSI authentication must be enabled for the named SCSI routing instance. If iSCSI authentication is not enabled, the user name and password assigned to the SCSI routing instance will not be used.

Examples

The following example enables iSCSI authentication, using the default authentication list, for the SCSI routing instance named *lab3* and assigns a user name of *lab3-admin* and a password of *testing* to the instance for two-way authentication:

```
[SN5428-2A]# scsirouter lab3 authentication default
*[SN5428-2A]# scsirouter lab3 username lab3-admin
*[SN5428-2A]# scsirouter lab3 password testing
```

Related Commands

Command	Description
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
scsirouter password	Assign a password to a SCSI routing instance for iSCSI authentication purposes.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.

session-timeout

To set the number of minutes a Telnet or SSH management session (or an Administrator mode session via the EIA/TIA-232 console connection) to the SN 5428-2 Storage Router can be inactive before the session times out, use the **session timeout** command. To prevent management sessions from timing out, use the **no** form of this command.

session-timeout *nn*

no session-timeout

Syntax Description

nn	The number of minutes the management session can be inactive before it is terminated. By default, management sessions do not timeout.

Defaults

There is no timeout for management sessions. This has the same effect as the following command:

session-timeout 0

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to configure the number of minutes a Telnet or SSH management session (or an Administrator mode session via the console) can be inactive before it is terminated. By default, management sessions do not time out.

When an Administrator mode session via the console times out, the console returns automatically to Monitor mode. If passwords are enabled on the console, the password prompt displays.

A change in the session timeout value is effective at the next time-check interval, and will affect all currently logged in management sessions as well as future sessions, until the storage router is restarted.

Use the **show system** command to display the current time out value for management sessions.

Examples

The following example allows management sessions to be inactive for 15 minutes before being terminated.

```
[SN5428-2A]# session-timeout 15
```

The following example disables automatic termination of inactive management sessions:

```
[SN5428-2A]# no session-timeout
```

Related Commands

Command	Description
show sessions	Display information about active console, Telnet, SSH or GUI sessions to the storage router.
show system	Display selected system information.

setup

To configure the SN 5428-2 Storage Router using the setup configuration wizard, use the **setup** command. The Setup configuration wizard runs the Management Interface, Date and Time, Network Management, Management Access, and SCSI routing (if applicable) individual wizards in sequence.

setup

Syntax Description

This command has no arguments or keywords.

Defaults

For multiple choice questions, the system presents the choices enclosed in brackets, **[ ]**. Each multiple choice question has a default answer that is selected when you press Enter or Return. The default is shown in parentheses, **( )**. For example:

```
Enable High Availability? [yes/no (no)]
```

For configuration variables, the current value saved in the system is presented in brackets. For example:

```
Network mask ? [255.255.255.0]
```

If the configuration variable does not have a value, the system will present a set of "empty" brackets, [(empty)], or a template that provides the required format of the value. For example:

```
SN5428-2 system name? [(empty)]
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Initial system configuration and subsequent reconfiguration can be performed via interactive configuration wizards through the console interface (or via Telnet or SSH once the management interface has been configured). The configuration wizards prompt you for the necessary information to accomplish the specific configuration task and may invoke multiple commands to complete their functions.

The CLI provides the following configuration wizards:

- Setup—runs the Management Interface, Date and Time, Network Management, Management Access, and SCSI routing (if applicable) individual wizards in sequence.
- Management Interface—configures the management interface with a system name, IP address, and optional DNS server information.
- Date and Time—configures the time zone, use (or non-use) of daylight savings time, and the NTP server address (if one is present) or the current date and time.
- Network Management—configures the use of Telnet, web-based GUI, and SNMP for managing the storage router over the network.

- Management Access—configures passwords for monitoring and configuring the storage router.
- SCSI Routing—configures a SCSI routing instance. The wizard is only available when the storage router is deployed for SCSI routing; it is not available if the storage router is deployed for transparent SCSI routing.
- FCIP—configures FCIP instances. The wizard is only available when the storage router is deployed for FCIP; it is not available if the storage router is deployed for SCSI routing or transparent SCSI routing.

If the storage router is deployed for SCSI routing, the CLI also provides a Cluster wizard, which configures the storage router to participate in a high availability cluster. Because the initial configuration script configures the high availability environment, the Setup configuration wizard does not include the Cluster wizard. However, the Cluster wizard, using the **setup cluster** command, can be run after initial system configuration to change the configuration mode from standalone to clustered, to change membership from one cluster to another, or to resign from a cluster and run as a standalone storage router. See Chapter 2, "First-Time Configuration," for more information about initial system configuration.

During configuration with the Setup configuration wizard, operational changes take place and are applied to the currently running system. For example, after the Network Management wizard completes, SNMP network management will be configured for the storage router. However, these changes are not saved to the system's bootable configuration until the end of the entire Setup configuration wizard. To quit the setup configuration wizard without saving changes, press **Ctrl-C** at any time before the end of the wizard, and then reboot the storage router to restore previous values.

Note Some changes may be retained after a reboot. Be sure to review the values provided in the prompts that display if you rerun the setup configuration wizard or run each individual wizard.

After entering the Setup configuration wizard, several informational messages display, including the following prompt:

```
User level for setup? [novice/expert (expert)]
```

- Enter **novice** to continue with the configuration process. Explanatory text displays before each prompt in the wizard.
- Enter **expert** to continue with the configuration process, suppressing all explanatory text. If you are an experienced user familiar with the setup configuration wizard, you may prefer this option.

At the end of the Setup configuration wizard, the following prompt displays:

```
Done with setup.
```

Note Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Examples

The following shows the initial explanatory text for the **setup** command:

```
[SN5428-2_A]# setup

You are about to set up the SN5428-2. Running this wizard will modify
the configuration of this system.

During setup, operational changes will take place. However, these changes
are not saved until the end of the script. To quit the setup wizard without
saving changes, ** hit CTRL-C at any time **. Reboot to restore previous values.

For multiple choice questions, the system will present the choices enclosed
in brackets []. Each multiple choice question has a default answer that is
selected when you press return.
  Example: [yes/no (no)].
  Choices are yes and no. No is the default answer.

For configuration variables, the current value saved in the system is
presented in brackets [varname]. If the configuration variable does not have a
value, the system will present a set of brackets [(empty)] or a template that
provides the expected format of the value.
  Example: [mySN5428-2]  configuration variable has a value
  Example: [(empty)]   configuration variable does not have a value, no template
  Example: [A.B.C.D]   template for an IP address.

User level for setup? [novice/expert (expert)]
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup access

To configure passwords for monitoring and administering the SN 5428-2 Storage Router, use the **setup access** configuration wizard. The wizard prompts you to enter and confirm new passwords.

setup access [*parameter1 parameter2...*]

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

The factory default password for both Administrator mode and Monitor mode is *cisco*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The wizard prompts you to enter (and confirm by re-entering) the new Monitor password, which allows view-only access to the storage router. It also prompts you to enter (and confirm by re-entering) the new Administrator password, which allows changes to be made to the storage router configuration. Passwords are cluster configuration elements. In a high availability (HA) cluster, the **setup access** wizard can only be run from the storage router that is currently performing password management functions.

Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup access** wizard from a command script. All parameters required by the wizard must be included. The **setup access** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup access** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup access** command when using the *parameter* arguments.

Examples

The following example sets the Monitor mode and Administrator mode passwords for the storage router, but does not apply them to the console interface. Administrator contact information is also configured. Passwords display as asterisks when entered.

```
[SN5428-2_PR]# setup access

################################
##  Management Access Setup  ##
################################

The SN5428-2 CLI and GUI are protected by two passwords. The initial password
entered when logging in allows the user to monitor the SN5428-2, but does not
allow changes. The "admin" password allows the user to make configuration
changes.
Enter the current "monitor" password:******

** Password Rules **
A password can contain any combination of numbers and letters, but should
not be something familiar to you and easy to guess.

Enter the new "monitor" password: *****

Enter the new "monitor" password again: *****

Enter the current "admin" password: ******

Enter the new "admin" password: *****

Enter the new "admin" password again: *****

The new passwords will apply to all telnet and web-based GUI sessions.
They will also be applied to the console. If the SN5428-2 console is in
a physically secure location, console passwords are not recommended
since they can be lost or forgotten. If the SN5428-2 is deployed in a
less secure environment, the passwords should be applied. If passwords
are subsequently lost, visit http://www.cisco.com/public/Support_root.shtml
for information on recovery.

Apply passwords to console ? [yes/no (no)] no

The administrative contact is the person or group responsible for
configuration and management of the SN5428-2. The system will store a name,
e-mail address, phone number, and pager number for the system administrator.
Management applications can retrieve this information and provide it to a
support person or directly use it to e-mail or page the administrator.

Input Administrator Info? [yes/no (yes)] yes
Administrator name? [(empty) ] Pat Hurley
Phone? [(empty) ] 123.456.7890
Pager number? [(empty)] 12.456.3444 pin 2234
Email? [(empty)] hurley@abc123z.com

Done with setup.
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup cluster

To configure the high availability (HA) environment for the SN 5428-2 Storage Router, to add the storage router to a cluster, or to remove it from an existing cluster, use the **setup cluster** configuration wizard. The wizard prompts you to select the appropriate HA configuration mode, enter a cluster name and (if necessary) an HA interface IP address and subnet mask.

setup cluster [*parameter1 parameter2...***]**

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

Defaults or current values are shown in parentheses within the allowable response brackets. In the following example, the allowable responses are *retain* and *delete*, and the default is *delete*.

```
Retain or delete applications ? [retain/delete (delete)]
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The HA features of the SN 5428-2 Storage Router are designed around a cluster of systems that back each other up in case of failure. A cluster consists of two identically configured SN 5428-2s (or one SN 5428 and one SN 5428-2) that continually exchange HA information over their HA and management interfaces.

Clusters are defined by name. The **setup cluster** command prompts you for the appropriate HA configuration mode and the cluster name.

- Use the **standalone** keyword to identify the storage router as not participating in a cluster. A standalone storage router does not require the management or HA interfaces to be available in order to complete the system configuration. The MGMT and HA ports do not need to be cabled.
- Use the **clustered** keyword to identify the storage router as participating in a cluster. A clustered SN 5428-2 requires the management and HA interfaces to be available in order to complete the system configuration. The MGMT and HA ports must be correctly cabled.

The command also prompts you to either retain the SCSI routing instance configurations for this storage router, merging them with others in the cluster, or to delete the existing SCSI routing instance configuration data and replace it with cluster data. Retained SCSi routing instance configuration data is replicated to other storage routers in the cluster. When joining an existing cluster, access list information and other cluster configuration elements, including VLAN, AAA and password settings, are always deleted and replaced by the cluster's access lists and other cluster configuration elements.

Caution Retaining SCSI routing instance configuration data could provide unexpected results.

Changing the cluster name, thereby joining another cluster, has the following effects on its existing configurations and operations:

- All SCSI routing instances are failed over to another member in the original cluster.
- All applications are stopped.
- The cluster name is changed.
- If you choose to retain data, any unsaved cluster configuration information is saved.
- The system reboots. Configuration information is exchanged and the storage router learns AAA, access list, password, SCSI routing instance and VLAN configuration information from the cluster. All of the original SCSI routing instances appears in the new cluster, unless you chose to delete rather than retain data.
- Access lists that existed on the storage router prior to joining the new cluster are always deleted. To preserve an existing access list and make it available to the new cluster, you must save the access list to a configuration file before issuing the **setup cluster** command. Make the saved configuration file available to the storage router currently performing access list maintenance functions for the cluster (via the **copy** command), and then restore the saved access list to the new cluster from that configuration file. See Chapter 10, "Configuring a High Availability Cluster," for more information about configuring the storage router to participate in a cluster.
- For cases where the names of SCSI routing instances are duplicated within the new cluster (meaning instances of the same name are already running in the new cluster), configuration data from the old cluster is deleted in favor of what is currently running in the new cluster.

Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup cluster** wizard from a command script. All parameters required by the wizard must be included. The **setup cluster** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup cluster** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup cluster** command when using the *parameter* arguments.

Examples

The following shows example output and input for the **setup cluster** command:

```
[SN5428-2_PR]# setup cluster

The system has the ability to run in a standalone or clustered state.
By default, the system will run in a clustered state and communicate
with other SN5428-2s in the same cluster. If a single SN5428-2 is deployed
and you don't intend to add a second SN5428-2 to provide high availability
features in a clustered configuration, you should configure the SN5428-2 in
standalone mode. Enter CTRL-C at any prompt to cancel changes and return
to the command prompt.
HA configuration? [standalone/clustered (standalone)] clustered
```

If you select HA configuration mode *clustered*, the wizard prompts you to enter an HA IP address:

```
To determine the health of other SN5428-2s in a cluster, the SN5428-2 must send
occasional heartbeat packets on at least two interfaces (in case one interface
has problems). By default, the interfaces used are the 10/100 management
interface (already set up) and the 10/100 HA interface. Please select an IP
address and network mask for the HA interface.

HA Interface IP address? [10.1.40.230/24]
```

After selecting the HA configuration mode, and optionally setting the HA IP address, the wizard prompts you to enter a cluster name:

```
When you change the cluster that the SN5428-2 belongs to, you need to
decide if you want the scsirouter instances running on the SN5428-2 to be
deleted or if you want them to be retained and merged with the new cluster.

Change cluster to ? [Cluster1]

For a change from standalone to clustered:
If you retain the configuration, there may be conflicts when the
scsirouter instances are replicated between this SN5428-2 and others in the
new cluster.

For a change from clustered to standalone:
You can retain the configuration without causing any scsirouter instance
conflicts for this SN5428-2 since it will be the only member of the
new cluster.
Retain or delete scsirouter instances ? [retain/delete (delete)] retain
```

If you choose to retain the existing SCSI routing instance configurations, an additional warning displays:

```
############################################################
Please confirm that you want to retain the configuration.
############################################################

All configuration settings will be saved.
The system will REBOOT if you answer "yes"
** Enter CTRL-C to cancel. **

Are you sure you want to retain the configuration ? [must type "yes"] yes
```

If you choose to delete your existing configuration, this warning displays:

```
Retain or delete applications ? [retain/delete (delete)] delete

############################################################
Please confirm that you want to delete the configuration.
############################################################

Cluster configuration settings will be saved.
The system will REBOOT if you answer "yes"
** Enter CTRL-C to cancel and abort the cluster change. **

Are you sure you want to delete the configuration ? [must type "yes"] yes
```

After confirming your selection, the storage router automatically reboots.

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup fcip

To configure an FCIP instance, use the **setup fcip** configuration wizard. The wizard prompts you to choose the name of the FCIP instance and specify the Gigabit Ethernet IP address and network mask. Then the wizard prompts you to enter the peer IP address and the connection protocol type. More extensive configuration of FCIP instances can be performed via the CLI or the web-based GUI.

setup fcip [*parameter1 parameter2...***]**

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

Defaults or current values are shown in parentheses within the allowable response brackets. In the following example, the current default FCIP instance name is *fcip1*.

```
Create which FCIP instance ? [fcip1/fcip2 (fcip1)]
```

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

The **setup fcip** command can only be run when at least one FCIP instance is not currently configured on the storage router; if both FCIP instances are configured, you cannot run the **setup fcip** wizard. Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup fcip** wizard from a command script. All parameters required by the wizard must be included. The **setup fcip** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup fcip** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup fcip** command when using the *parameter* arguments.

Examples

The following shows example output and input for the **setup scsi** command:

```
[techpubs4]# setup fcip

In order to correctly configure this FCIP instance, be sure you know
the configuration of the remote FCIP instance. You will need to know
the IP address and the communication protocol of the remote FCIP instance.
In addition, you will need to ensure that the Fibre Channel domain ID you
assign is different than the Fibre Channel domain ID assigned to the remote
SN 5428-2-K9.

The system enables you to create two FCIP instances. Each instance
uses a different Fibre Channel interface and gigabit Ethernet interface.


Create which FCIP instance ? [fcip1/fcip2 (fcip1)] fcip2

Please specify an IP address and netmask for the gigabit
Ethernet interface.
IP address? [A.B.C.D/nn] 10.1.0.16/24

If both gigabit Ethernet interfaces are cabled to the same network, you
can configure the FCIP instance to failover to the secondary interface
in case of a failure on the primary interface.

Configure secondary interface for the FCIP instance? [yes/no (no)] no

Please enter the IP address of the remote FCIP instance to
which you wish to connect.
IP address of remote FCIP instance? [A.B.C.D] 10.1.0.47

Choose how you want the FCIP instance to communicate with the
remote FCIP instance. If the remote FCIP instance is configured to use raw IP,
select raw as the protocol. If the remote FCIP instance is configured as a TCP
server, select client. If the remote FCIP instance is configured as a TCP client,
select server.


Use which protocol? [raw/client/server] raw
```

If this is the first FCIP instance to be configured on the storage router, you will be prompted to specify a Fibre Channel domain ID:

```
Please specify a domain ID for use by this FCIP instance. This
domain ID must be unique. It can not be assigned to any switch in the Fibre
Channel fabric that this switch is connected to or assigned to any switch
in the remote Fibre Channel network.

Domain ID for the Fibre Channel switch? [1 - 127] 80
set Domain ID on Fibre Channel interfaces to 80
Mar 14 15:08:48: %FC-5-FCIP09: fcip2 has been started

FCIP, fcip2, created
Mar 14 15:08:48: %UI-5-FAFD2: Added FCIP device fci2
Mar 14 15:08:48: %UI-5-NMAOOI: Address 10.1.0.16/24 is now operational on interface ge1
Mar 14 15:08:48: %UI-5-FAFNI: Added FCIP network interface ge2, 10.1.0.16/255.255.255.0
FCIP-2: addPeer raw 10.1.0.47
Mar 14 15:08:48: %UI-5-FAFD: Added FCIP destination dest2 (raw, 10.1.50.50)
Configuration complete.

FCIP instance fcip2 is now configured.

Done with setup.
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup iscsi-port

To change the default listening port used for iSCSI traffic, use the **setup iscsi-port** wizard.

setup iscsi-port [*parameter1 parameter2...*]

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

The default listening port used for iSCSI traffic is 3260. This is the port number assigned by IANA.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If you change the listening port used for iSCSI traffic on the storage router, you must make corresponding changes to the IP hosts sending iSCSI traffic to the storage router. For example, on a UNIX system, you must update the /etc/services file. After selecting a new port for iSCSI traffic, the storage router automatically reboots.

Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup iscsi-port** wizard from a command script. All parameters required by the wizard must be included. The **setup iscsi-port** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup iscsi-port** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup iscsi-port** command when using the *parameter* arguments.

Examples

The following shows example output and input for the **show iscsi-port** command:

```
[SN5428-2A]# setup iscsi-port

##############################
##  iSCSI port Setup Wizard  ##
##############################
If you change the iSCSI port number, the system will reboot itself
for the change to take effect. This will cause all scsirouters to
be stopped.
** Enter CTRL-C to cancel. **
```

```
Do you want to change the iSCSI port number?[yes/no (no)] yes

##########################
##  Changing iSCSI port ##
##########################
Now, you will need to enter a new iSCSI port number. The new port
will be used as the iSCSI server listen port. Make sure the new
port is not used by other applications in your network environment.

New port number ? [nn] 5003

########################################################
##  Please confirm that you want to change iSCSI port  ##
########################################################

iSCSI port configuration settings will be saved.
The system will REBOOT if you answer "yes".
** Enter CTRL-C to cancel. **

Proceed to change the iSCSI port?[yes/no (no)] yes
```

After confirming your intentions, the storage router automatically reboots.

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup fcip	Run the wizard to manually configure FCIP instances.
setup cluster	Change the configuration of the high availability environment.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup mgmt

To configure the SN 5428-2 Storage Router management interface, use the **setup mgmt** configuration wizard. The wizard prompts you to enter the system name, management interface IP address and subnet mask, optional default gateway and DNS information.

setup mgmt [*parameter1 parameter2...***]**

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

Defaults or current values are shown in parentheses within the allowable response brackets. In the following example, the current system name is *SN5428-2_Lab1*.

```
SN5428-2 system name? [SN5428-2_Lab1]
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The management interface must be configured before the Telnet interface or web-based GUI can be used for configuration or monitoring tasks. When the wizard is completed, the system displays notification that the management interface is operational.

Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup mgmt** wizard from a command script. All parameters required by the wizard must be included. The **setup mgmt** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup mgmt** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup mgmt** command when using the *parameter* arguments.

Examples

The following shows example output for the **setup mgmt** command:

```
[SN5428-2A]# setup mgmt

################################
## Management Interface Setup ##
################################

Please choose a name for the SN5428-2. This name is associated with the
SN5428-2 Management Interface IP address. If you wish to enable network
management on the SN5428-2, you should add the system name you provide
at this prompt and its IP address to a domain name server (nis, nis+, WINS).

SN5428-2 system name? [SN5428-2A]

The SN5428-2 may be managed using telnet, or a web-based GUI, or SNMP via the
10/100 Ethernet interface labeled "mgmt" on the front panel of the system. This
interface must be assigned an IP address.

Management Interface IP address? [10.1.12.122/24]

If the SN5428-2 is to be managed from a subnet other than the one to which it
is physically attached, a static route is required. The static route format
is "destination/netmask gateway".

Static route for Management Interface? [0.0.0.0/0 10.1.12.1]

If IP addresses are to be entered as host names via any of the SN5428-2
management interfaces, a Domain Name Server must be specified. A secondary
DNS may be specified for use if the primary DNS is not available.

Primary DNS Server? [A.B.C.D]

Secondary DNS Server? [A.B.C.D]

Setting up the management interface ...  Done


The management port is now operational. It may be tested using ping
or telnet from a host on the network.


Done with setup.
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup netmgmt

To enable network management via any or all of the available interfaces (Telnet, web-based GUI, or SNMP), use the **setup netmgmt** configuration wizard. The wizard prompts you to selectively enable the various interfaces and, if SNMP is enabled, will prompt you to enter the read and write community information, IP addresses for SNMP traps, and additional SNMP configuration information.

setup netmgmt [*parameter1 parameter2...***]**

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

Defaults or current values are shown in parentheses within the allowable response brackets. In the following example, the default name for the read community is *public*:

```
Read Community ? [public]
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

All network management interfaces are enabled by default, with SNMP "gets" via the public read community. Run this wizard to disable any of these interfaces, or to change the SNMP read community, configure the SNMP write community for SNMP "sets," or add addresses for SNMP traps.

Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup netmgmt** wizard from a command script. All parameters required by the wizard must be included. The **setup netmgmt** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup netmgmt** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup netmgmt** command when using the *parameter* arguments.

Examples

The following shows example output and input for the **setup netmgmt** command:

```
[SN5428-2A]# setup netmgmt
####################################
## Network Management Access Setup ##
####################################

This wizard will enable you to configure access to telnet, the web-based
GUI, and configure SNMP. By default, telnet and the web-based GUI are
enabled. SNMP gets via the "public" community are also enabled via the
10/100 management interface. If you want to change these values or configure
other SNMP features, please set up the network management.

Set up Network Management ? [yes/no (yes)] yes

Enable telnet on all interfaces? [yes/no (yes)] yes

Configure SNMP ? [yes/no (yes)] yes
```

If you select to configure SNMP, the wizard prompts you for the following information:

```
Read Community ? [public]

Write Community ? [private] mynetmanagers

First IP address for SNMP traps ? [A.B.C.D] 10.1.30.17

Trap version for first IP address? [1/2 (1)]

Second IP address for SNMP traps ? [A.B.C.D] 10.1.30.18

Trap version for second IP address? [1/2 (1)]

Send auth trap when requester specifies
incorrect community? [yes/no (no)] yes

Modify link up/down traps for one or more interfaces? [yes/no (yes)] yes

Send link up/down traps for MGMT interface? [yes/no (yes)] yes

Send link up/down traps for HA interface? [yes/no (yes)] yes

Send link up/down traps for GE interface? [yes/no (yes)] no

Send link up/down traps for fibre
channel interface? [yes/no (yes)] yes
```

The wizard ends by displaying the following information:

```
Network Management setup is complete.

By default, these methods of network management will work from any network
which is not separated from the SN5428-2 by a firewall or other traffic-limiting
device. To further specify security requirements, please use the normal
configuration functions of the CLI or GUI after completing this wizard.


Done with setup.
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup scsi	Run the wizard to configure a SCSI routing instance.
setup time	Run the wizard to configure the system date and time.

setup scsi

To configure a SCSI routing instance, use the **setup scsi** configuration wizard. The wizard prompts you to enter the name of the SCSI routing instance (maximum 32 characters) and to specify the IP address and Gigabit Ethernet interface for the SCSI routing instance. Then the wizard discovers all Fibre Channel devices connected to the SN 5428-2 Storage Router. More extensive configuration of SCSI routing instances can be performed via the CLI or the web-based GUI.

setup scsi [*parameter1 parameter2...***]**

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

Defaults or current values are shown in parentheses within the allowable response brackets. In the following example, the current default Gigabit Ethernet interface is *ge1*.

```
Scsirouter instance GE interface ? [ge1|ge2 (ge1)]
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

After the wizard finishes the discovery process, it displays a list of accessible storage resources. Targets can be explicitly added by using the web-based GUI or CLI commands.

The **setup scsi** command can only be run when no SCSI routing instance is currently configured on the storage router. Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup scsi** wizard from a command script. All parameters required by the wizard must be included. The **setup scsi** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup scsi** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup scsi** command when using the *parameter* arguments.

Examples

The following shows example output and input for the **setup scsi** command:

```
[SN5428-2A]# setup scsi
########################
##  scsirouter Setup ##
########################
This wizard will enable you to set up a scsirouter instance, but will not enable you to
specify a VLAN for the IP interface. If a VLAN is required for the scsirouter instance,
please use CLI commands to configure the scsirouter.
Do you want to configure a scsirouter instance ? [yes/no (no)] yes

scsirouter instance name ? [(empty)] foo

The scsirouter instance communicates with IP hosts via the Gigabit Ethernet interface. To
enable communication, you need to assign an IP address and network mask to the scsirouter
instance for it to use on the Ethernet interface.

IP Address ? [A.B.C.D/nn] 10.1.0.45/24

Enter the name of the GE interface that you want the scsirouter instance to use.
Scsirouter instance GE interface ? [ge1|ge2 (ge1)] ge2

Please wait ...

Now discovering all FC devices connected to the SN 5428-2-K9...

A scsirouter has been created. A list of accessible FC devices
is shown in the table below. Use the "scsirouter" command or the
configuration screen via the GUI to define one or more scsirouter targets.

Access to scsirouter targets will be disabled until access is explicitly
configured using the "scsirouter" command or the configuration
via the GUI.

Fabric Attached Devices detected
Interface WWPN             PortId   Device Type Lun   Lunid Type     Lunid
--------- ---------------- -------- ----------- ----- -------------- -----
fc1       2200001026448a0d 0x101e1  Disk        0     IEEE Extended  2000001026448a0d
fc1       22000003be3203bc 0x101e2  Disk        0     IEEE Extended  20000003be3203bc

Lun Description Table
Interface WWPN             Lun   Capacity Vendor       Product      Serial
--------- ---------------- ----- -------- ------------ ------------ ------
fc1       2200001026448a0d 0     17GB     SEAGATE      ST217340EB   2BB01L3J0000600256BW
fc1       22000003be3203bc 0     17GB     SEAGATE      ST217341EB   2DU0537A00006105FGJ6

scsirouter setup is complete.


Done with setup.
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup time	Run the wizard to configure the system date and time.

setup time

To set current date and time information and other time-related configuration settings, use the **setup time** configuration wizard. The storage router uses date and time information for log files and the user interface.

setup time [*parameter1 parameter2...***]**

Syntax Description

parameter1 parameter2 ...	(Optional) Enter each parameter that the wizard prompts for. All parameters must be passed. If a parameter includes an embedded space, enclose the parameter in quotation marks.

Defaults

Defaults or current values are shown in parentheses within the allowable response brackets. In the following example, the current date is *02/05/2002*.

```
Date (mm/dd/yyyy)? [02/05/2002]
```

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The wizard prompts you to enter the appropriate time zone (as an offset from Universal/GMT). You can also enter an optional IP address of an NTP server, to be used by the storage router for date and time synchronization. If no NTP server address is provided, the wizard prompts you for the current date and time.

Only one setup wizard can be active at any given time. Multiple users cannot run multiple setup wizards concurrently.

Use the optional *parameter* arguments to run the **setup time** wizard from a command script. All parameters required by the wizard must be included. The **setup time** wizard will not complete unless all parameters are passed.

Note If too many parameters are passed, the **setup time** wizard will ignore the extra parameters and may complete. If a parameter is not in the correct format or is otherwise invalid, the next parameter is used to attempt to fulfill the prompt. In either case, unexpected results could occur. Always check the output from a **setup time** command when using the *parameter* arguments.

Examples

The following shows example output and input for the **setup time** command:

```
[SN5428-2A]# setup time

#########################
## Date and Time Setup ##
#########################

To provide correct information in log files and user interfaces, the SN5428-2
must have a reasonably accurate date and time.

To use Daylight Savings Time or specify time zone by geographic region
use the "clock timezone" command.

The time zone must be entered as an offset from GMT.
   0=[0000 GMT]     1=[-0100 WAT]   2=[-0200 AT]
   3=[-0300 Brazil] 4=[-0400 AST]   5=[-0500 EST]
   6=[-0600 CST]    7=[-0700 MST]   8=[-0800 PST]
   9=[-0900 YST]   10=[-1000 AHST] 11=[-1100 NT]
  12=[+1200 IDLW]  13=[+1100 WST]  14=[+1000 GST]
  15=[+0900 JST]   16=[+0800 CCT]  17=[+0700 WAST]
  18=[+0600 ZP6]   19=[+0500 ZP5]  20=[+0400 ZP4]
  21=[+0300 BT]    22=[+0200 EET]  23=[+0100 CET]

Time Zone? [0-23] 6

If a Network Time Protocol (NTP) server is in use on a network reachable
via the SN5428-2 management interface, it may be used to keep the SN5428-2 date
and time in sync with the rest of the network.

NTP Server IP Address? [A.B.C.D] 10.1.60.86
```

If you enter the NTP server IP address, the date and time is synchronized with the network and the wizard completes. If you do not enter an NTP server IP address, the wizard prompts you for the current date and time information.

```
NTP Server IP Address? [A.B.C.D]

Date (mm/dd/yyyy)? [02/05/2002]

Time (hh:mm:ss)? [16:42:38] 10:42:12

Date and time are now configured.

Done with setup.
```

Related Commands

Command	Description
clear conf	Return most configuration settings to factory defaults.
setup	Run the setup configuration wizard.
setup access	Run the wizard to configure Monitor mode and Administrator mode passwords.
setup cluster	Change the configuration of the high availability environment.
setup fcip	Run the wizard to manually configure FCIP instances.
setup iscsi-port	Run the wizard to manually configure the port used for iSCSI traffic.
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
setup scsi	Run the wizard to configure a SCSI routing instance.

show aaa

To display AAA configuration information and operational statistics, use the **show aaa** command.

show aaa [from {*filename* **| bootconfig | runningconfig}]**

show aaa [stats]

Syntax Description

from *filename*	(Optional) The name of the configuration file where the AAA configuration is stored. This file must exist in the *savedconfig* directory.
from bootconfig	(Optional) Display the AAA information from the persistent saved configuration.
from runningconfig	(Optional) Display the AAA information from the currently running configuration.
stats	(Optional) Display the number of authentication requests received and sent since the storage router was last rebooted.

Defaults

If no **from** parameter is specified, the display shows information from the currently running configuration.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.
3.3.1	The **from**, **bootconfig**, and **runningconfig** keywords and the *filename* argument were added.

Usage Guidelines

Use this command to display the current AAA configuration for the storage router. Use the **stats** keyword to display usage statistics. Use the **from bootconfig** keywords to display the specified AAA configuration information as it exists in the current saved configuration, used when the storage router restarts. This may differ from the running configuration.

Examples

The following example output displays the current AAA authentication configuration for the storage router from the persistent saved configuration. The iSCSI default authentication list indicates that authentication first tries to contact TACACS+ servers. If no server is found, TACACS+ returns an error and AAA tries to use the local username database for authentication. If a match is found, the IP host is allowed access; if no match is found, the IP host is denied access. If this attempt returns an error, the IP host is not allowed access.

```
[SN5428-2A]# show aaa from bootconfig
aaa new-model
aaa authentication iscsi default group tacacs+ local
username "fred" password "9 af4f2428498a41a31e237de1c4a9b9fcef"
username "pat" password "9 7ddbccc3d0daf013f4293c3d3bd94539dd"
username "kris" password "9 0607167520058771e66ab1d379d7e6505f"
username "adrian" password "9 0ad24a3b35dc296d894e512416d572b3ee"
radius-server retransmit 12
radius-server host 10.5.0.53 auth-port 1645
tacacs-server timeout 12
tacacs-server host 10.7.0.22 auth-port 49
```

The following is example output from the **show aaa stats** command:

```
[SN5428-2A]# show aaa stats
authentication requests received =         134
authentication responses sent    =         134
authentication requests canceled =           0
authentication requests passed   =         130
authentication requests failed   =           4

            RADIUS Server Hosts
   IP Address    port  timeouts   bad resps
--------------- ----- ---------- ----------
      10.5.0.53  1645          0          0

            TACACS+ Server Hosts
   IP Address    port  timeouts   bad resps
--------------- ----- ---------- ----------
      10.7.0.22    49          0          0
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server radius	Create a named group of RADIUS servers for AAA authentication services.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
debug aaa	Enable debugging for the AAA authentication services.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
username password	Add a user name and optional password to the local username database.

show accesslist

To display a list of access lists or the contents of the named access list (or all access lists), use the **show accesslist** command.

show accesslist [*name* **| all] [from {***filename* **| bootconfig | runningconfig}]**

Syntax Description

name	(Optional) The name of the access list.
all	(Optional) Display all access list entries.
from *filename*	(Optional) The name of the configuration file where the access list configuration is stored. This file must exist in the *savedconfig* directory.
from bootconfig	(Optional) Display the access list information from the persistent saved configuration.
from runningconfig	(Optional) Display the access list information from the currently running configuration.

Defaults

If no **from** parameter is specified, the display shows information from the currently running configuration.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

- Use the **show accesslist** command to display a list of all access lists from the current running configuration.
- Use the **all** keyword to display the contents of all access lists.
- Use the **from bootconfig** keywords to display the specified access list information as it exists in the current saved configuration, used when the storage router restarts. This may differ from the running configuration.

Examples

To display a list of access lists, issue this command:

```
[SN5428-2A]# show accesslist
```

To display the contents of all access lists from the current running configuration, issue this command:

```
[SN5428-2A]# show accesslist all
```

To display the contents of all access lists as they exist in the current bootable configuration, issue this command:

```
[SN5428-2A]# show accesslist all from bootconfig
```

To display the contents of the access list named *webserver2* from the current running configuration, issue this command:

```
[SN5428-2A]# show accesslist webserver2
```

To display the contents of the access list named *webserver2* as it exists in the saved configuration file *backup_1218*, issue this command:

```
[SN5428-2A]# show accesslist webserver2 from backup_1218
```

Related Commands

Commands	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
accesslist chap-username	Add CHAP user name entries to an access list.
accesslist iscsi-name	Add iSCSI Name entries to an access list.
delete accesslist	Delete a specific access list entry or an entire access list.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
scsirouter target accesslist	Associate an access list with a specific SCSI routing instance target or all targets.

show admin

To display the system administrator contact information, use the **show admin** command.

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The following information displays:

- Contact name
- E-mail address
- Phone number
- Pager number

Examples

The following example displays the system administrator contact information:

```
[SN5428-2A]# show admin
Administrator Contact Information
         Name: Pat Hurley
        Email: phurley@abc123z.com
        Phone: 123.456.7890
        Pager: 123.456.3444 pin 2234
```

Related Commands

Command	Description
admin contactinfo	Configure the storage router administrator contact information.

show boot

To display system boot information and startup file parameters, use the **show boot** command.

show boot

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to view system boot information, such as the boot device type, path to the boot image, and path to the file containing the startup commands. The **show boot** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example displays system boot information:

```
[SN5428-2A]# show boot
         Boot Device: ata=0,00
           Boot File: /ata0/vxWorks
        Startup File: /ata0/NuSpeed.start
               Flags: 0x0
               Other: fei
```

Related Commands

Command	Description
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.

show bootconfig

To display the bootable configuration for the SN 5428-2 Storage Router, or to save the commands used to create the bootable configuration to a file, use the **show bootconfig** command.

show bootconfig [to *filename***]**

Syntax Description

to *filename*	(Optional) Save the bootable configuration as a series of CLI commands and descriptive text to the specified file. The file will be saved in the *script* directory.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **to** keyword to save the bootable configuration as a series of CLI commands and descriptive text in the specified file. This file is saved in the *script* directory and can be used as a basis to create command scripts to automate common tasks. Use the **read script** command to execute a command script.

Note A saved configuration file requires editing before it can be used as a command script via the **read script** command.

Table 12-20 describes the significant elements that are displayed:

Table 12-20 Elements Displayed for the "show bootconfig" Command

Element	Description
AAA	Authentication, authorization, and accounting method configuration information.
ACCESSLIST	Access list description and entry information.
ADMIN	The storage router administrator contact information.
ADMIN LOGIN	The Administrator mode password.
CDP	Cisco Discovery Protocol configuration, including timer and holdtime settings.
CLUSTER	The name of the cluster to which this storage router belongs.
DNS	The name of any defined domain name servers.
FCIP	FCIP instance configuration information.

Table 12-20 Elements Displayed for the "show bootconfig" Command (continued)

Element	Description
FC PORTS	Operational characteristics of the Fibre Channel interfaces.
FC SWITCH	Global Fibre Channel attributes.
FC ZONE	Zone configuration information.
FC ZONE ALIAS	Zone alias configuration information.
FC ZONE SET	Zone set configuration information.
GE	IP addresses and operational characteristics of the Gigabit Ethernet interfaces.
HA	HA configuration information.
HA Port	IP address and operational characteristics of the HA interface.
LOGGING ROUTE FACILTIY	The logging table.
Mgmt Port	IP address and operational characteristics of the management interface.
MONITOR LOGIN	The Monitor mode password.
RESTRICT	Storage router interface restrictions.
RIP	Routing Information Protocol (RIP) configuration information.
ROUTES	The routing table.
SCSIROUTER	Configuration information for each SCSI routing instance, including name, description, server interface and other instance-specific configuration information.
SNMP	The SNMP settings.
SNTP	Date and time information, including the address of any associated NTP server.
SOFTWARE	The default download location for storage router software.
SSH	Secure Shell (SSH) configuration information.
SYSLOG	Remote logging configuration information.
SYSTEM	SN 5428-2 Storage Router name.
TELNET	Session timeout information.
VLAN	VLAN configuration information.
VTP DOMAIN	VTP domain name.
VTP MODE	VTP configuration mode.

Examples

The following is example output from the **show bootconfig** command, for a storage router deployed for SCSI routing:

```
[SN5428-2A]# show bootconfig
!
! CLUSTER
!
! cluster Lab1
!
! ACCESSLIST
```

```
!
accesslist aegis
accesslist aegis 10.2.0.23/255.255.255.255
accesslist aegis 10.3.0.36/255.255.255.255
accesslist aegis 10.4.0.49/255.255.255.255
accesslist aegis iscsi-name ign.1987-05.com.cisco.08.80342789af73ebcdef123.xxx
accesslist aegis iscsi-name ign.1987-05.com.cisco.08.7125abc9af73ebcdef123.xxx
accesslist aegis iscsi-name ign.1987-05.com.cisco.08.1234abecf9876bac00034.xxx
accesslist aegis chap-username 12h7b.lab2.webservices
accesslist aegis chap-username dorothy
accesslist aegis chap-username lab2servp
!
! VTP DOMAIN
!
vtp domain none
!
! VTP MODE
!
vtp mode client
!
! VLAN
!
! (no vlan(s) found)
!
! SCSIROUTER
!
scsirouter zeus
scsirouter zeus authenticate "none"
scsirouter zeus primary "none"
scsirouter zeus reserve proxy disable
scsirouter zeus failover primary none
scsirouter zeus failover secondary none
scsirouter zeus lun reset no
scsirouter zeus serverIf ge1 10.1.0.45/255.255.255.0
scsirouter zeus target webserver2 wwpn "21:00:00:05:ae:03:6d:6e"
scsirouter zeus target webserver2 enabled
scsirouter zeus target webserver2 accesslist "aegis" rw
scsirouter zeus target webserver2 accesslist “any” ro
!
! SYSTEM
!
hostname SN5428-2A
!
! Mgmt Port
!
interface mgmt ip-address 10.1.10.244/255.255.255.0
!
! HA Port
!
interface ha ip-address 10.1.20.56/255.255.255.0
!
! GE
!
interface ge1 autonegotiation autodetect
interface ge1 mtusize 1500
interface ge1 vlan enable
!
! GE
!
interface ge2 autonegotiation autodetect
interface ge2 mtusize 1500
interface ge2 vlan enable
!
! ROUTES
```

```
!
ip route 10.1.30.0/255.255.255.0  10.1.10.201
ip route 10.1.40.243/255.255.255.255 10.1.10.201
ip route 10.1.50.249/255.255.255.255 10.1.10.201
ip default-gateway 10.1.10.201
!
! RIP
!
no ip rip enable
ip rip timers invalid 180
!
! ADMIN
!
admin contactinfo name “pat”
!
! ADMIN LOGIN
!
admin password <password>
!
! MONITOR LOGIN
!
monitor password <password>
!
! SNTP
!
ntp peer 10.1.60.86
clock timezone CST6CDT
!
! SNMP
!
snmp-server community public ro
snmp-server community private rw
no snmp-server host all traps
no snmp-server sendauthtraps
snmp-server linkupdown mgmt
snmp-server linkupdown ge1
snmp-server linkupdown ge2
snmp-server linkupdown fc1
snmp-server linkupdown fc2
snmp-server linkupdown fc3
snmp-server linkupdown fc4
snmp-server linkupdown fc5
snmp-server linkupdown fc6
snmp-server linkupdown fc7
snmp-server linkupdown fc8
!
! DNS
!
ip name-server 10.1.40.243 10.1.50.249
ip domain-name mystoragenet.com
!
! TELNET
!
no session-timeout
!
! SSH
!
ssh enable
!
! SOFTWARE
!
software http url "http://www.cisco.com"
software http username “ciscocustomer” password "<password>"
software proxy username none
```

```
!
! HA
!
! ha configuration clustered
!
! SYSLOG
!
logging syslog 10.1.40.251
!
! LOGGING ROUTE FACILITY
!
logging level notice from all to all
logging level info from all to logfile

!
! RESTRICT
!
restrict mgmt ftp
no restrict mgmt telnet
no restrict mgmt http
no restrict mgmt snmp
restrict mgmt ssl
no restrict mgmt ssh
!
restrict ha ftp
restrict ha telnet
no restrict ha http
no restrict ha snmp
restrict ha ssl
restrict ha ssh
!
restrict ge1 ftp
restrict ge1 telnet
restrict ge1 http
restrict ge1 snmp
restrict ge1 ssl
restrict ge1 ssh
!
restrict ge2 ftp
restrict ge2 telnet
restrict ge2 http
restrict ge2 snmp
restrict ge2 ssl
restrict ge2 ssh
!
! CDP
!
cdp enable
cdp timer 60
cdp interface mgmt enable
cdp interface ha enable
cdp interface ge1 enable
cdp interface ge2 enable
!
! FC SWITCH
!
fcswitch ratov 10000
fcswitch edtov 2000
fcswitch dstov 5000
fcswitch fstov 1000
fcswitch zoning default all
fcswitch zoning autosave enable
fcswitch zoning merge SW2
fcswitch domainid 1 force
```

```
no fcswitch domainid lock enable
fcswitch interop-credit 12
!
! FC ZONE ALIAS
!
fcalias iscsi
fcalias iscsi member wwpn 280000048aa58710
fcalias iscsi member wwpn 290000048aa58710
fcalias leto
fcalias leto member wwpn 201b00491585c219
!
! FC ZONE
!
zone agamemnon
zone agamemnon member wwpn 201b00491585c219
zone agamemnon member fcalias leto
!
! FC ZONE SET
!
zoneset helen
zoneset helen zone agamemnon
no zoneset helen enable
!
! FC PORTS
!
interface fc1 enable
interface fc1 ms-enable enable
no interface fc1 al-fairness enable
interface fc1 fan-enable enable
interface fc1 ext-credit 0
interface fc1 mfs-bundle enable timeout 10
interface fc1 linkspeed auto
interface fc1 type gl-port
!
interface fc2 enable
interface fc2 ms-enable enable
no interface fc2 al-fairness enable
interface fc2 fan-enable enable
interface fc2 ext-credit 0
interface fc2 mfs-bundle enable timeout 10
interface fc2 linkspeed auto
interface fc2 type gl-port
!
interface fc3 enable
interface fc3 ms-enable enable
no interface fc3 al-fairness enable
interface fc3 fan-enable enable
interface fc3 ext-credit 0
interface fc3 mfs-bundle enable timeout 10
interface fc3 linkspeed auto
interface fc3 type gl-port
!
interface fc4 enable
interface fc4 ms-enable enable
no interface fc4 al-fairness enable
interface fc4 fan-enable enable
interface fc4 ext-credit 0
interface fc4 mfs-bundle enable timeout 10
interface fc4 linkspeed auto
interface fc4 type gl-port
!
```

```
interface fc5 enable
interface fc5 ms-enable enable
no interface fc5 al-fairness enable
interface fc5 fan-enable enable
interface fc5 ext-credit 0
interface fc5 mfs-bundle enable timeout 10
interface fc5 linkspeed auto
interface fc5 type gl-port
!
interface fc6 enable
interface fc6 ms-enable enable
no interface fc6 al-fairness enable
interface fc6 fan-enable enable
interface fc6 ext-credit 0
interface fc6 mfs-bundle enable timeout 10
interface fc6 linkspeed auto
interface fc6 type gl-port
!
interface fc7 enable
interface fc7 ms-enable enable
no interface fc7 al-fairness enable
interface fc7 fan-enable enable
interface fc7 ext-credit 0
interface fc7 mfs-bundle enable timeout 10
interface fc7 linkspeed auto
interface fc7 type gl-port
!
interface fc8 enable
interface fc8 ms-enable enable
no interface fc8 al-fairness enable
interface fc8 fan-enable enable
interface fc8 ext-credit 0
interface fc8 mfs-bundle enable timeout 10
interface fc8 linkspeed auto
interface fc8 type gl-port
!
! AAA
!
aaa new-model
username "fred" password "9 af4f2428498a41a31e237de1c4a9b9fcef"
username "pat" password "9 7ddbccc3d0daf013f4293c3d3bd94539dd"
username "kris" password "9 0607167520058771e66ab1d379d7e6505f"
username "adrian" password "9 0ad24a3b35dc296d894e512416d572b3ee"
radius-server retransmit 12
radius-server host 10.5.0.53 auth-port 1645
radius-server host 10.6.0.61 auth-port 1645
radius-server host 10.7.0.62 auth-port 1645
tacacs-server timeout 12
tacacs-server host 10.7.0.22 auth-port 49
aaa group server radius "testradius"
aaa group server radius "testradius" server 10.5.0.53 auth-port 1645
aaa group server radius "testradius" server 10.6.0.61 auth-port 1645
aaa authentication iscsi default local group radius local-case
aaa authentication iscsi test group testradius local
aaa authentication enable default group radius enable
aaa authentication login default group radius monitor
```

The following example creates a command file called *SN5428-2AScript1* in the *script* directory. It contains many of the CLI commands that were issued to create the current bootable configuration.

```
[SN5428-2A]# show bootconfig to SN5428-2AScript1
```

Related Commands

Command	Description
read script	Read and execute the CLI commands in the named script file.
restore all	Restore the contents of the named configuration file into memory.
save all	Save all configuration information
show runningconfig	Display the running configuration, or create a command file based on the running configuration.
show savedconfig	List the contents of the savedconfig directory or the contents of the named configuration file.
show script	Display the contents of the script directory or the contents of the named command file.

show buffers

To display buffer pool information for a variety of areas, use the **show buffers** command.

show buffers

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The display includes the number of free memory buffers for each pool, along with those currently allocated to various functions. The **show buffers** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is sample output from the **show buffers** command:

```
[SN520A]# show buffers
Pool System:

type         number
---------    ------
FREE     :    42086
DATA     :      0
HEADER   :      0
SOCKET   :     14
PCB      :     21
RTABLE   :     31
HTABLE   :      0
ATABLE   :      0
SONAME   :      0
ZOMBIE   :      0
SOOPTS   :      0
FTABLE   :      0
RIGHTS   :      0
IFADDR   :     18
CONTROL  :      0
OOBDATA  :      0
IPMOPTS  :      1
IPMADDR  :      5
IFMADDR  :      0
MRTABLE  :      0
TOTAL    :    42176
LOW WTR  :    42082
```

```
number of mbufs: 42176
number of times failed to find headers: 0
number of times failed to find clusters: 0
number of times waited for space: 0
number of times drained protocols for space: 0
_____________________
CLUSTER POOL TABLE
_____________________________________________________________________________
size      clusters  free      usage         low water
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------

Pool iSCSI:

type        number
---------   ------
FREE    :    3240
DATA    :       0
HEADER  :       0
SOCKET  :       0
PCB     :       0
RTABLE  :       0
HTABLE  :       0
ATABLE  :       0
SONAME  :       0
ZOMBIE  :       0
SOOPTS  :       0
FTABLE  :       0
RIGHTS  :       0
IFADDR  :       0
CONTROL :       0
OOBDATA :       0
IPMOPTS :       0
IPMADDR :       0
IFMADDR :       0
MRTABLE :       0
TOTAL   :    3240
LOW WTR :    3240
number of mbufs: 3240
number of times failed to find headers: 0
number of times failed to find clusters: 0
number of times waited for space: 0
number of times drained protocols for space: 0
_____________________
CLUSTER POOL TABLE
_____________________________________________________________________________
size     clusters  free      usage         low water
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------

########## Output from CPP ##########

Pool System:

type        number
---------  ------
FREE    :    6240
DATA    :       0
HEADER  :       0
SOCKET  :      31
PCB     :      48
RTABLE  :      36
HTABLE  :       0
ATABLE  :       0
```

```
SONAME  :      0
ZOMBIE  :      0
SOOPTS  :      0
FTABLE  :      0
RIGHTS  :      0
IFADDR  :     12
CONTROL :      0
OOBDATA :      0
IPMOPTS :      5
IPMADDR :     12
IFMADDR :      0
MRTABLE :      0
TOTAL   :    16384
LOW WTR :    16224
number of mbufs: 16384
number of times failed to find headers: 0
number of times failed to find clusters: 0
number of times waited for space: 0
number of times drained protocols for space: 0
_____________________
CLUSTER POOL TABLE
_____________________________________________________________________________
size     clusters  free      usage         low water
-----------------------------------------------------------------------------
64       1449      1412      50            1408
128      1688      1643      76660         1637
256      1847      1822      36            1817
512      1941      1910      76646         1904
-----------------------------------------------------------------------------

Pool Data:

type         number
---------    ------
FREE    :    16800
DATA    :      0
HEADER  :      0
SOCKET  :      0
PCB     :      0
RTABLE  :      0
HTABLE  :      0
ATABLE  :      0
SONAME  :      0
ZOMBIE  :      0
SOOPTS  :      0
FTABLE  :      0
RIGHTS  :      0
IFADDR  :      0
CONTROL :      0
OOBDATA :      0
IPMOPTS :      0
IPMADDR :      0
IFMADDR :      0
MRTABLE :      0
TOTAL   :    16800
LOW WTR :    16386
number of mbufs: 16800
number of times failed to find headers: 0
number of times failed to find clusters: 0
number of times waited for space: 0
number of times drained protocols for space: 0
_____________________
```

```
CLUSTER POOL TABLE
_____________________________________________________________________________
size     clusters  free      usage         low water
-----------------------------------------------------------------------------
64       2832      2832      58994         2816
128      4124      4124      367277        3946
256      901       901       138752        770
512      947       947       67656         857
1024     96        96        37952         68
2048     97        97        1051          96
-----------------------------------------------------------------------------

Net Buffers:

type         number
---------    ------
FREE    :      12798
USED    :          2
TOTAL   :      12800
```

Related Commands

Command	Description
show stack	Display the memory stack on a per-task basis.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show cdp

To display global Cisco Discovery Protocol (CDP) configuration information for the SN 5428-2 Storage Router, including timer and holdtime information, use the **show cdp** command.

show cdp

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command displays current CDP configuration. Use this command to determine if CDP is enabled, and view packet timing and holdtime information. CDP allows network applications to learn device-type information and the SNMP agent address of neighboring devices.

Examples

The following example displays CDP configuration information for the storage router. It shows that CDP is enabled and packets are sent every minute. The storage router directs its neighbors to hold its CDP advertisements for 3 minutes (the default CDP **holdtime** value). The storage router is also enabled to send CDP version 2 advertisements.

```
[SN5428-2A]# show cdp
Global CDP information:
        CDP is enabled
        Sending CDP packets every 60 seconds
        Sending a holdtime value of 180 seconds
        Sending CDPv2 advertisements are enabled
```

Table 12-21 describes the significant fields shown in the display.

Table 12-21 Description of Fields in the "show cdp" Command Output

Field	Definition
Sending CDP packets every *nn* seconds	The interval (in seconds) between transmissions of CDP advertisements. This field is controlled by the **cdp timer** command.

Table 12-21 Description of Fields in the "show cdp" Command Output (continued)

Field	Definition
Sending a holdtime value of *nn* seconds	The amount of time (in seconds) the storage router directs a neighbor to hold the CDP advertisement before discarding it. This field is controlled by the **cdp holdtime** command.
Sending CDPv2 advertisements are enabled	Indicates that CDP version 2 advertisements are enabled.

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.
show cdp entry	Display information about a specific neighbor device listed in the CDP neighbors table.
show cdp interface	Display information about the storage router interfaces on which CDP is enabled.
show cdp neighbors	Display detailed information about neighboring devices discovered using CDP.
show cdp traffic	Display information about traffic between devices gathered using CDP.

show cdp entry

To display information about a specific neighboring device or all neighboring devices discovered using CDP, use the **show cdp entry** command.

show cdp entry {*device-id* | **all**}

Syntax Description

device-id	The device ID of the CDP neighbor about which you want information.
all	Display all CDP neighbors.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display operational information about CDP neighbors known to the storage router. Use **show cdp neighbors** command to display the device ID for the neighbor about which you want additional information.

Examples

The following is sample output from the **show cdp entry** command. Information about all neighboring devices is displayed, including device ID, address and protocol, platform, interface, holdtime, and version.

```
[SN5428-2A]# show cdp entry all
----------------------------------------
Device ID: SCA0428017Q(lab-SN5428-2A.mylab.com)
Entry address(es):
  IP address: 10.2.1.28
Platform: WS-C6509,  Capabilities: Trans-Bridge Switch IGMP
Interface: ge2,  Remote Port (outgoing port): 4/13
Holdtime : 176 sec

Version :
WS-C6509 Software, Version McpSW: 6.1(1b) NmpSW: 6.1(1b)
Copyright (c) 1995-2000 by Cisco Systems

advertisement version: 1
```

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.
show cdp	Display global CDP configuration information for the storage router.
show cdp interface	Display information about the storage router interfaces on which CDP is enabled.
show cdp neighbors	Display detailed information about neighboring devices discovered using CDP.
show cdp traffic	Display information about traffic between devices gathered using CDP.

show cdp interface

To display information about the SN 5428-2 Storage Router interfaces on which CDP is enabled, use the **show cdp interface** command.

show cdp interface [*if-name*]

Syntax Description

if-name	Display CDP status and operational information for the specified interface. The following are valid interface names: mgmt, ha, ge1 and ge2.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

CDP can be enabled for all storage router interfaces, including the management, high availability, and Gigabit Ethernet interfaces. Use the **show cdp interface** command to display a brief summary of all interfaces on which CDP is enabled. To display status and operational information for a specific interface, add the interface name argument.

Examples

The following is example output from the **show cdp interface** command:

```
[SN5428-2A]# show cdp interface
Port      CDB Status
--------  ----------
mgmt      enabled
ha        enabled
ge1       enabled
ge2       enabled
```

The following is example output for the management interface (*mgmt*):

```
[SN5428-2A]# show cdp interface mgmt
Port      CDB Status
--------  ----------
mgmt      enabled
```

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.
show cdp	Display global CDP configuration information for the storage router.
show cdp entry	Display information about a specific neighbor device listed in the CDP neighbors table.
show cdp neighbors	Display detailed information about neighboring devices discovered using CDP.
show cdp traffic	Display information about traffic between devices gathered using CDP.

show cdp neighbors

To display detailed information about neighboring devices discovered using CDP, use the **show cdp neighbors** command.

show cdp neighbors [interface *if-name***] [detail]**

Syntax Description

interface *if-name*	(Optional) Keyword and name of the interface connected to the neighbors for which you want information.
detail	(Optional) Display detailed information about a neighbor (or neighbors) including network address, enabled protocols, holdtime, and software version.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show cdp neighbors** command to display brief or detailed information about neighboring devices discovered using CDP. Add the **interface** keyword and the interface name to limit the display to neighbors connected to that specific interface.

Use the **detail** keyword to display detailed information about all devices, or devices connected to the specified interface.

Examples

The following is example output from the **show cdp neighbors** command:

```
[SN5428-2A]# show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater
Device-ID                  Capability Platform             Remote Port
-------------------------- ---------- -------------------- -----------
SCA05600126(kal6-lab-swa.cm TSI        WS-C6509             4/16
SCA05600126(kal6-lab-swa.cm TSI        WS-C6509             4/12
JAB04140GZC(kal6-lab-z4-swa TS         WS-C2948             1/23
```

Table 12-22 describes the significant fields shown in the display.

Table 12-22 Description of Fields in the "show cdp neighbors" Command Output

Field	Description
Capability Codes	The type of device that can be discovered.
Device-ID	The name of the neighbor device and either the MAC address or the serial number of this device. This field is truncated after 27 characters.
Capability	The type of the device listed in the CDP Neighbors table. Possible values are: • R—Router • T—Transparent bridge • B—Source-routing bridge • S—Switch • H—Host • I—IGMP device • r—Repeater
Platform	The product number of the device. This field is truncated after 21 characters.
Remote Port	The outgoing port information.

The following is sample output for one neighbor from the **show cdp neighbors detail** command. The output includes additional information about the neighbor, including network address, enabled protocols, and software version.

```
[SN5428-2A]# show cdp neighbors detail
----------------------------------------
Device ID: TRC0448016Q(lab-sn5428-2a.mlab.com)
Entry address(es):
  IP address: 10.2.0.83
Platform: WS-C6509,  Capabilities: Trans-Bridge Switch IGMP
Interface: mgmt,  Remote Port (outgoing port): 7/48
Holdtime : 138 sec

Version :
WS-C6509 Software, Version McpSW: 6.1(1b) NmpSW: 6.1(1b)
Copyright (c) 1995-2000 by Cisco Systems

advertisement version: 2
VTP Management Domain: 'LAB-SN5428-2A'
Native VLAN: 220
Duplex: half
----------------------------------------
Device ID: 000421b45a00(lab32)
Entry address(es):
  IP address: 10.2.0.185
Platform: SN5428-2,  Capabilities: Router
Interface: mgmt,  Remote Port (outgoing port): fei0
Holdtime : 174 sec

Version :
Cisco SN5428-2 Software Version 3.2.1

advertisement version: 2
```

Table 12-23 describes the significant fields shown in the display.

Table 12-23 Description of Fields in the "show cdp neighbors detail" Command Output

Field	Description
Device-ID	The name of the neighbor device and either the MAC address or the serial number of this device.
Entry address(es)	A list of network addresses of neighbor devices.
IP address	The IP address of the neighboring device.
Platform	The product number of the device.
Capabilities	The device type of the neighbor. This device can be a router, a bridge, a transparent bridge, a source-routing bridge, a switch, a host, an IGMP device, or a repeater.
Interface	The storage router interface used to connect to this neighbor.
Remote Port	The outgoing port number.
Holdtime	The remaining amount of time (in seconds) the current device will hold the CDP advertisement from a sending device before discarding it.
Version	The software version of the neighbor device.
advertisement version	The CDP advertisement version.
VTP Management Domain	The name of the VTP management domain.
Native VLAN	The native VLAN identification number.
Duplex	The duplex state of the connection between the storage router and the neighbor device.

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.
show cdp	Display global CDP configuration information for the storage router.
show cdp entry	Display information about a specific neighbor device listed in the CDP neighbors table.
show cdp interface	Display information about the interfaces on which CDP is enabled.
show cdp traffic	Display information about traffic between devices gathered using CDP.

show cdp traffic

To display information about traffic between devices gathered using Cisco Discovery Protocol (CDP), use the **show cdp traffic** command.

show cdp traffic

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to view statistics about CDP traffic between the storage router and other devices.

Examples

The following is example output from the show cdp traffic command.

```
[SN5428-2A]# show cdp traffic
CDP counters :
        Total packets output: 4968, Input: 22329
        Hdr syntax: 0, Chksum error: 0, Encaps failed: 0
        No memory: 0, Invalid packet: 0, Fragmented: 0
        CDP version 1 advertisements output: 1242, Input: 9911
        CDP version 2 advertisements output: 3726, Input: 12418
```

Table 12-24 describes the fields shown in the display.

Table 12-24 Description of Fields in the "show cdp traffic" Command Output

Field	Description
Total packets output	The number of CDP advertisements sent by the storage router. This value is the sum of the "CDP version 1 advertisements output" and "CDP version 2 advertisements output" fields.
Input	The number of CDP advertisements received by the storage router. This value is the sum of the "CDP version 1 advertisements input" and "CDP version 2 advertisements input" fields.
Hdr syntax	The number of CDP advertisements with bad headers received by the storage router.
Chksum error	The number of times the verification operation failed on incoming CDP advertisements.

Table 12-24 Description of Fields in the "show cdp traffic" Command Output (continued)

Field	Description
Encaps failed	The number of times CDP failed to send advertisements on an interface because of a failure caused by the bridge port of the storage router.
No memory	The number of times the storage router did not have sufficient memory to store the CDP advertisements in the advertisement cache table when the storage router attempted to assemble advertisement packets for transmission or to parse them when receiving them.
Invalid packet	The number of invalid CDP advertisements received and sent by the storage router.
Fragmented	The number of times fragments or portions of a single CDP advertisement were received by the storage router instead of the complete advertisement.
CDP version 1 advertisements output	The number of CDP version 1 advertisements sent by the storage router.
Input	The number of CDP version 1 advertisements received by the storage router.
CDP version 2 advertisements output	The number of CDP version 2 advertisements sent by the storage router.
Input	The number of CDP version 2 advertisements received by the storage router.

Related Commands

Command	Description
cdp enable	Enable or disable CDP on the SN 5428-2 Storage Router.
cdp holdtime	Specify the amount of time the receiving device should hold a CDP packet from the SN 5428-2 Storage Router before discarding it.
cdp interface	Switch CDP on or off for the specified interface.
cdp timer	Specify the amount of time between transmissions of CDP packets from the SN 5428-2 Storage Router.
show cdp	Display global CDP configuration information for the storage router.
show cdp entry	Display information about a specific neighbor device listed in the CDP neighbors table.
show cdp interface	Display information about the interfaces on which CDP is enabled.
show cdp neighbors	Display detailed information about neighboring devices discovered using CDP.

show cli

To display information about the command line interface (CLI), use the **show cli** command.

show cli [*command-keyword***] [***command-keyword ... command keyword ...***]**

show cli status

Syntax Description

command-keyword	(Optional) The first keyword in the command displays the CLI command tree for all varieties of that command.
status	(Optional) Keyword used to display the status of the last CLI command.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show cli** command to display the complete CLI command tree, along with helpful information about command parameters and arguments. Use the *command-keyword* arguments to display information about a specific set of commands, such as *scsirouter* or *cdp* commands. Only valid commands and keywords will be displayed.

The set of CLI commands and keywords that will be available to you depend on the level of authority associated with your CLI management session and the deployment option selected for the storage router during initial configuration.

Use the **status** keyword to display the status of the last CLI command that was issued. A status of "0" indicates that the command completed without errors. A status of "-13" indicates that the command syntax was invalid.

Examples

The following is example output from the **show cli** command, showing the CLI command tree information for the **ping** command.

```
[SN5428-2A]# show cli ping
ping                                    Send ICMP pings to a host
  <A.B.C.D | servername>                IP address or hostname to ping
    numpkts                             Number of packets to attempt
      <npkts>                           Integer greater than zero (Default is 5)
        size                            Size of packet
          <sn>                          Integer (64..4096), default is 64
    size                                Size of packet
      <sn>                              Integer (64..4096), default is 64
```

Related Commands

Command	Description
help	Display information about how to use the CLI.

show clock

To display the current system date and time, use the **show clock** command.

show clock

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display the storage router date and time setting.

Examples

The following is example output from the **show clock** command:

```
[SN5428-2A]# show clock
Thurs Mar  21 15:54:25 GMT+6 2002
```

Related Commands

Command	Description
clock set	Set the system clock to the given date and time.
clock timezone	Specify the storage router time zone information.
ntp peer	Specify the name or IP address of the NTP server with which the storage router will synchronize date and time.
setup time	Run the wizard to configure date and time information (including NTP server and time zone) associated with the storage router.

show cluster

To display operational information related to the high availability (HA) cluster, use the **show cluster** command.

show cluster

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display cluster information for the storage router whether it is in standalone or clustered mode.

Examples

The following example displays cluster information. In this example, the storage router named SN 5428-2A belongs to a cluster.

```
[SN5428-2A]# show cluster
   Cluster Name: Weblab
       Cluster Changes: 2
       Last Change: Tue Mar 19 04:12:51 GMT+6 2002
       IP Multicast Address: 224.0.0.101
        Operating Message Version: V3
       Detected Configuration Errors: None

   Local Node: SN5428-2A
       HA Configuration: CLUSTERED
       HA: up      MGMT Port: up      HA Port: up
       Sent 19240 heartbeats
       Rcvd 19238 heartbeats

   Cluster Node List:
System Name       MGMT IP         HA IP             Last Heard From
 SN5428-2A        10.1.10.244     10.1.20.56        Self
 SN5428-2B        10.1.10.223     10.1.20.98        Tue Mar 18 05:17:43

   Application List:
Application Name               Master on       State      Last Config Update
scsirouter/scsi1               SN5428-2A       Master     Mar 18 21:23:45
scsirouter/scsi2               SN5428-2B       Slave      Mar 18 23:21:10

AAA, Access List, password, & VLAN Management is on SN5428-2B
```

The following example displays cluster information about a standalone storage router:

```
[SN5428-2A]# show cluster
Cluster Name: 630041D
       Cluster Changes: 0
       Last Change: Mon Nov 19 14:09:18 GMT+6 2001
       IP Multicast Address: 224.0.0.101
        Operating Message Version: V3
       Detected Configuration Errors: None

   Local Node: SN5428-2A
       HA Configuration: STANDALONE
       HA: down     MGMT Port: up     HA Port: down
       Sent 0 heartbeats
       Rcvd 0 heartbeats

   Cluster Node List:
System Name         MGMT IP        HA IP             Last Heard From
 SN5428-2A          10.1.10.244    no IP address     Self

   Application List:
Application Name                Master on       State      Last Config Update
scsirouter/foo                  SN5428-2A       Master     Jan 19 13:05:33

AAA, Access List, password & VLAN Management is on SN5428-2A
```

Table 12-25 describes the fields shown in the display.

Table 12-25 Description of Fields in the "show cluster" Command Output

Field Name	Description
Cluster Name	The name of the HA cluster.
Cluster Changes	The number of cluster changes made to this storage router since it was initially configured, or since the last **clear conf** command was issued.
Last Change	The date and time of the last cluster configuration change.
IP Multicast Address	The IP address used for multicast communications. IANA has assigned the multicast IP address 224.0.0.101 to the Cisco SN 5428-2 Storage Router.
Operating Message Version	The version identifier for system messages, including HA messages exchanged between storage routers in a cluster.
Detected Configuration Errors	The total number of configuration errors, if any, detected by the system.
Local Node	The name of the storage router.
HA Configuration	Indicates the configuration of HA in the storage router. Valid configurations are STANDALONE or CLUSTERED.
HA	Indicates the state of the HA application in the storage router. Valid states are *up* or *down*. If the HA configuration is STANDALONE, the HA state should be *down*.
MGMT Port	Indicates the state of the physical management port. Valid states are *up* or *down*.
HA Port	Indicates the state of the physical HA port. Valid states are *up* or *down*.
Sent . . . heartbeats	Number of heartbeats transmitted on the HA network.
Recvd . . . heartbeats	Number of heartbeats received on the HA network.

Table 12-25 Description of Fields in the "show cluster" Command Output (continued)

Field Name	Description
Cluster Node List	A list of storage routers in the cluster.
System Name	The name of the storage router.
MGMT IP	The IP address of the cluster node management interface.
HA IP	The IP address of the cluster node HA interface.
Last Heard From	The date and time the cluster node was last heard from.
Application List	A list of applications running on the storage router.
Application Name	A list of all SCSI routing instances in the cluster.
Master on	The name of the storage router currently running this SCSI routing instance.
State	The state of the SCSI routing instance on this storage router.
Last Config Update	The date and time of the last configuration change to this SCSI routing instance.
AAA, Access List, password & VLAN management is on	The name of the storage router in the cluster that currently handles access list, VLAN, AAA, and password management functions.

Related Commands

Command	Description
save all	Save all configuration information.
save system	Save selected system configuration information.
setup cluster	Change the configuration of the high availability environment.
show ha	Display HA operational statistics for the storage router or for a specific application.
show system	Display selected system information, including system name.

show cpu

To display CPU utilization information, use the **show cpu** command.

show cpu

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to view the percentage of CPU utilization for the last five seconds, the last minute, and the last five minutes. The **show cpu** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example output from the show cpu command:

```
[SN5428-2A]# show cpu
CPU Utilization for last 5 seconds: 1%; last 1 minute: 2%; last 5 minutes: 2%
```

Related Commands

Command	Description
show buffers	Display information about buffer pools.
show memory	Display information about memory and related resources.
show stack	Display the memory stack on a per-task basis.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show crash

To display saved crash trace information or current crash trace information, use the **show crash** command.

show crash [current]

Syntax Description		
	current	(Optional) Returns the current crash trace information for the running system.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History	Release	Modification
	3.2.1	This command was introduced.

Usage Guidelines

The default crash trace file is crash-cpp.txt in the *log* directory. This file is created if the SN 5428-2 unexpectedly restarts. Use the **current** keyword to display the crash trace information as it exists for the currently running system. To save the command output, redirect the output of your console using the logging facilities for your specific console interface. Depending on your console interface and scroll buffer size, you may also be able to copy and paste the contents from your console into an ASCII text file.

The **show crash** command is designed for debug purposes and should only be used under the guidance of a Cisco Technical Support professional.

Examples

The following example displays the beginning of current crash trace information:

```
[SN5428-2A]# show crash current
#
# Crash Information (/ata4/log/tmpcrash.txt)
#

Cisco Systems Crash Trace
#
# System Information
#
Time Stamp:       Thu Mar 13 16:04:35 CST 2002
System Model:     SN5428-2
Software Version: 3.3.1-K9
#
# Exception Information
#
intContext: -1
Task:       0xffffffff
Param 1:    0xffffffff
Param 2:    0xffffffff
```

```
Panic Msg:  NULL
#
# Boot Information
#
VxWorks (for Galileo GT64260/MPC7410) version 5.4.1.
Kernel: WIND version 2.5.
Made on Dec 12 2002, 15:13:30.
Boot line:
ata=0,00(0,0):/ata0/vxWorks e=10.1.10.244:ffffff00 tn=lab2 s=/ata0/NuSpeed.start o=fei
#
#Task List#
#
```

In the following example, no saved crash trace information exists. This condition occurs when the command is issued and the storage router has never unexpectedly restarted.

```
show crash
#
# Crash Information (/ata4/log/crash-cpp.txt)
#

No crash information available
```

Related Commands

Command	Description
show buffers	Display information about buffer pools.
show memory	Display information about memory and related resources.
show stack	Display the memory stack on a per-task basis.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show debug

To display a variety of debug information or perform specific troubleshooting activities, use the **show debug** command.

show debug {mailboxtrace | rawlundatabase} {*fci?* **| all}**

show debug portarray *fci?*

Syntax Description

fci?	The name of the internal Fibre Channel (FC) interface. Valid values are fci1 and fci2. When you type **fci?**, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
all	Keyword used to display the specified debug information for all internal FC interfaces.
mailboxtrace	Display mailbox trace data.
portarray	Display all active virtual ports. This command is only available in systems deployed for transparent SCSI routing.
rawlundatabase	Display raw inquiry data from all discovered LUNs.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display debugging information for internal FC interfaces. The **show debug** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example displays raw lun database information for all targets discovered on the internal FC interface *fci1*:

```
[SN5428-2_PR]# show debug rawlundatabase fci1

Entry Address = 0xd047ab4
fabricLoginFailureCode=0x0,fabricLoginExtendedCode=0x0,fabricLoginTimeoutCode=0x0
ReportLunsLLDStatus=0x0,ReportLunsLLDStatusModifier=0x0,ReportLunsSCSIStatus=0x0,ReportLun
sASCASCQ=0x0,ReportLunsLunCount=1
InquiryLLDStatus=0x0,InquiryLLDStatusModifier=0x0,InquiryLastLunWithLLDError=0x0,
InquirySCSIStatus=0x0,InquiryASCASCQ=0x0,InquiryLastLunWithSCSIStatusError=0x0
boolLunsNotSupported=0x0,InquiryLastLunNotSupported=0x0
loopId=0x0,masterState=0x6,slaveState=0x7,loggedIn=1,roles=1,valid=1,portId=0x104e1,scanLu
ns=0x0
numberLuns=0x1,reportAsyncEvent=0x0,node_wwn=0x20000004 0xae4122a6, port_wwn=0x21000004
0xae4322a6

lun=0, wwnn=0x20000020 0x37559b0e, reportAsyncEvent=0x0
stdInquiry data for lun=0x0
bytes0-7=0x00000332 0x8b00700a
vendorId=SEAGATE , product=ST318451FC      , revision=0001 device Type=0x0
DeviceIdPage:bytes0-3= 0x0083000c,bytes4-7= 0x01030008,bytes8-11= 0x20000020
            :bytes12-15= 0x37559b0e,bytes16-19=0x00800014,bytes20-23=0x33434330
S/N Page:bytes0-3= 0x00800014 s/n=3CC01M4K0000710367CX

Entry Address = 0xab1603c
fabricLoginFailureCode=0x0,fabricLoginExtendedCode=0x0,fabricLoginTimeoutCode=0x0
ReportLunsLLDStatus=0x0,ReportLunsLLDStatusModifier=0x0,ReportLunsSCSIStatus=0x0,ReportLun
sASCASCQ=0x0,ReportLunsLunCount=1
InquiryLLDStatus=0x0,InquiryLLDStatusModifier=0x0,InquiryLastLunWithLLDError=0x0,
InquirySCSIStatus=0x0,InquiryASCASCQ=0x0,InquiryLastLunWithSCSIStatusError=0x0
boolLunsNotSupported=0x0,InquiryLastLunNotSupported=0x0
loopId=0x1,masterState=0x6,slaveState=0x7,loggedIn=1,roles=1,valid=1,portId=0x101e2,scanLu
ns=0x0
numberLuns=0x1,reportAsyncEvent=0x0,node_wwn=0x20000004 0xae4304cd, port_wwn=0x22000004
0xae4304cd

lun=0, wwnn=0x20000004 0xae4304cd, reportAsyncEvent=0x0
stdInquiry data for lun=0x0
bytes0-7=0x00000312 0x8b00700a
vendorId=SEAGATE , product=ST318452FC      , revision=0002 device Type=0x0
DeviceIdPage:bytes0-3= 0x0083000c,bytes4-7= 0x01030008,bytes8-11= 0x20000004
            :bytes12-15= 0xae4304cd,bytes16-19=0x00700014,bytes20-23=0x43465630
S/N Page:bytes0-3= 0x00800014 s/n=3FZ0647A00a06216DVJ7

Entry Address = 0xcb1974c
fabricLoginFailureCode=0x0,fabricLoginExtendedCode=0x0,fabricLoginTimeoutCode=0x0
ReportLunsLLDStatus=0xbfc0,ReportLunsLLDStatusModifier=0x3801,ReportLunsSCSIStatus=0x7fcb,
ReportLunsASCASCQ=0x8c13,ReportLunsLunCou7
InquiryLLDStatus=0x5179,InquiryLLDStatusModifier=0x8492,InquiryLastLunWithLLDError=0x7a90,
InquirySCSIStatus=0xacea,InquiryASCASCQ=0x800b,InquiryLastLunWithSCSIStatusError=0xffe3
boolLunsNotSupported=0x38da7321,InquiryLastLunNotSupported=0xfc51
loopId=0x7e,masterState=0x6,slaveState=0x7,loggedIn=1,roles=0,valid=1,portId=0xffffe,scan
Luns=0x1
numberLuns=0x0,reportAsyncEvent=0x0,node_wwn=0x10000002 0x3d071161, port_wwn=0x20000002
0x3a171241
```

Related Commands

Command	Description
debug scsirouter	Enable debugging for the named SCSI routing instance
debug scsirouter target	Enable debugging for a specific SCSI routing instance target and LUN combination.

show debug fcip

To display a variety of debug information or perform specific troubleshooting activities for FCIP instances, use the **show debug fcip** command.

show debug fcip *name* **{mailboxtrace | packettrace}**

Syntax Description

name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.
mailboxtrace	Display mailbox trace data.
packettrace	Display packet trace data. **Note** The packet trace mask can be set for the current session using the **debug fcip** command. To retain the packet trace mask setting over a storage router restart, use the **fcip destination config** command.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

Use this command to display debugging information for FCIP instances. The **show debug** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example mailbox trace data for the FCIP instance named *fcip1*:

```
[SN5428-2A]# show debug fcip fcip1 mailboxtrace
qlpt 0xca99f98, unit 1
linkState Down, linkIsUp FALSE
Peer 0.0.0.0, isConnected TRUE
InitBlock values:
  Max IOCB Allocation 256, Max Frame Length 2112
  Execution Throttle 16, Retry Count 8
  Retry Delay 1, Inquiry Data 0
  Risc Option 0x8000, Additional Firmware Option 0x10
  Special Firmware Option 0x6000
FW_Rev 3.100.101, FW_State 0x4
pktTraceMask 0x0
mboxTracing Yes, cmdCount 0
requestQ: queue_base = 0xca92000
reqinptr = 28, reqoutptr = 0
reqInAbsAddress = 0xca92700, reqOutAbsAddress = 0xca92000
responseQ: queue_base = 0xca8c000
respinptr = 28, respoutptr = 28
respInAbsAddress = 0xca8c700, respOutAbsAddress = 0xca8c700
```

```
046: 40 8 - 0
     0009 9d40 0ca8 b000 0040 0000 0000 0000 0000
047: 41 1 - 0
     4000 1111 2222 3333 4444 5555 6666 7777 ffff
048: 40 8 - 0
     0009 9d80 0ca8 b000 0040 0000 0000 0000 0000
049: 41 1 - 0
     4000 1111 2222 3333 4444 5555 6666 7777 ffff
050: 40 8 - 0
     0009 9dc0 0ca8 b000 0040 0000 0000 0000 0000
051: 41 1 - 0
     4000 1111 2222 3333 4444 5555 6666 7777 ffff
052: 40 2 - 0
     0007 0800 0ca8 b000 0040 0000 0000 0000 0000
...
```

Related Commands

Command	Description
debug fcip	Enable debugging for the named FCIP instance.
fcip	Create an FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
show fcip	Display configuration and operational information for the named FCIP instance.

show debug fcswitch

To display internal Fibre Channel (FC) interface parameters, use the **show debug fcswitch** command.

show debug fcswitch {all | brief | memory | tech-support}

show debug fcswitch clish *text*

Syntax Description

all	Display all interface parameters for internal FC interfaces fc0, fc15, fci1 and fci2, including all switch log entries.
brief	Display all interface parameters for internal FC interfaces fc0, fc15, fci1 and fci2. Includes only the last 5 switch log entries.
memory	Display memory usage for the integrated FC switch component.
tech-support	Display technical support information for the integrated FC switch component.
clish *text*	Display internal operational information for the integrated FC switch component. The *text* argument is any valid switch "show" command. If the *text* argument includes spaces, enclose it in quotation marks.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **show debug fcswitch** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Use the **show debug fcswitch brief** or **show debug fcswitch all** commands to display initiator WWPN information (fci1 is initiator WWPN1 and fci2 is initiator WWPN2) and other parameters related to the internal FC interfaces.

Examples

The following example displays various configuration parameters for the internal FC interfaces, and the last five switch log entries:

```
[SN5428-2_PR]# show debug fcswitch brief

Interface WWPN switch port
--------- ----------------
fc0       200000021e071161
fc15      200f00021e071161
```

```
Initiator Value
--------- ----------------
WWPN1     280000021e071160
WWPN2     290000021e071160

Global attributes      Value
---------------------- -----
Switch Name             SN5428-2
Node WWN                100000021e071151
DomainID                1
Uptime (seconds)        76956
SysLogLevel             Critical
SysLogComp              NameServer MgmtServer Zoning Switch Chassis Blade Port Eport Other
DevLogLevel             Critical
DevLogComp              None
AlarmEntries            1

Display last 5 of 45 syslog entries
[41][Tue Mar 19 05:08:44.280 2002][C][Switch Management:0x3e061163.304.4][User interface
session 3 user cisco@OB-session3 has been ]

[42][Tue Mar 19 05:08:44.290 2002][C][Switch Management:0x3e061163.304.4][User interface
session <4> user <cisco@OB-session4> has t]

[43][Tue Mar 19 05:08:44.290 2002][C][Switch Management:0x3e061163.304.4][User interface
session 4 user cisco@OB-session4 has been ]

[44][Tue Mar 19 05:33:13.792 2002][C][Switch Management:0x3e061163.304.4][Successful login
user cisco@OB-session3 admin 1 address U]

[45][Tue Mar 19 05:33:13.793 2002][C][Switch Management:0x3e061163.304.4][User interface
session 3 has been opened]

Display 4 devlog entries
[1][Tue Mar 19 03:10:11.057 2002][DI][Switch Log Client/0:0x3e061163.0.5][requesting
logging oper data]

[2][Tue Mar 19 03:10:11.059 2002][DI][Switch Log Client/0:0x3e061163.0.5][received,
DS_RESP_STATUS msg,id = -987127616, status = 0x]

[3][Tue Mar 19 03:10:36.797 2002][DI][Switch Log Client/0:0x3e061163.0.5][updating logging
oper data]

[4][Tue Mar 19 03:10:38.713 2002][DC][Management Server:0x3e0671163.314.6][pltdb.cc.620:
database version '2' does not match code ve]
```

Related Commands

Command	Description
fcswitch devlog	Specify logging parameters for the switch development log file.
fcswitch syslog	Specify logging parameters for the switch system log file.

show debug interface fc?

To display debug information for internal Fibre Channel (FC) interface switch ports, use the **show debug interface fc?** command.

show debug interface *fc?* **[hosts | stats]**

Syntax Description

fc?	Display debug information for the specified internal FC interface switch ports. When you type the **show debug interface fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
hosts	Keyword used to display FC hosts information.
stats	Keywords used to display statistics and configuration information.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **show debug interface fc?** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example displays debug information for the internal FC interface switch port *fc0*:

```
[SN5428-2_PR]# show debug interface fc0
Operational Data
Interface Stat IP/Netmask               MAC          Options
--------- ---- ------------------------ ------------ -------
fc0       up                                         type Fibre Channel
                                                     OperState enabled
                                                     PortID 010000
                                                     WWN 200000059ba69821
                                                     LinkSpeed 2Gb/s
                                                     LinkState Active
                                                     SyncState SyncAcquired
                                                     LoginStatus LoggedIn
                                                     Loopback Status Not Running
                                                     MaxCredit 12
                                                     DonatedToPort None
                                                     RunningType f-port
                                                     PendingType f-port
                                                     InBandMgmt enabled
                                                     SFPType NotApplicable
                                                     SFPVendor N/A
                                                     SFPVendorID N/A
```

```
                                                    SFPPartNumber N/A
                                                    SFPRev N/A

Configuration Data
                    Al-      Ext    Fan-     Link  Loopback Mfs-     Time Port-   Port-
Interface Status    fairness credit enable   speed type     bundle   out  type    mode
--------- --------- -------- ------ -------- ----- -------- -------- ---- ------- ---------
fc0       enabled   disabled 0      enabled  2Gb/s Unknown  enabled  10   f-port
```

Related Commands

Command	Description
debug interface fc?	Enable IP packet tracing for the specified Gigabit Ethernet interface.

show debug interface ge?

To display IP packet trace buffer statistics and contents, use the **show debug interface ge?** command.

show debug interface ge*?* **trace stats**

show debug interface ge*?* **trace [first** *nn* **| last** *nn***]**

show debug interface ge*?* **trace hex [ascii] [first** *nn* **| last** *nn***]**

Syntax Description

ge*?*	Display IP trace information for the specified Gigabit Ethernet interface. When you type the **show debug interface ge?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
trace	Display the entire trace buffer, in hex.
trace stats	Display packet trace statistics and configuration information.
first *nn*	(Optional) Display the specified number of packets from the start of the trace buffer.
last *nn*	(Optional) Display the specified number of packets from the end of the trace buffer.
trace hex	Display packet trace in hex.
ascii	(Optional) Display packet trace in hex and ASCII.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.
3.3.1	The **hex** and **ascii** keywords were added.

Usage Guidelines

To enable IP packet trace facilities for debugging Gigabit Ethernet interfaces, use the **debug interface ge?** command. The **show debug interface ge?** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Note IP packet tracing must be disabled on the interface before the trace buffer can be displayed.

Examples

The following example disables IP packet tracing on the interface *ge1* and then displays the full contents of the trace buffer:

```
[SN5428-2_PR]# no debug interface ge1 trace enable

[SN5428-2_PR]# show debug interface ge1 trace
1: RX, len 60, time 0.000
0000: 01 00 0c cc cc cc 00 08 7c 3c 3d 85 00 28 aa aa
0010: 03 00 00 0c 20 04 01 00 01 00 0b 64 61 76 65 74
0020: 68 6f 00 02 00 05 81 00 03 00 05 a5 00 04 00 0a
0030: 00 08 7c 3c 3d 85 00 00 00 00 00 00
```

Related Commands

Command	Description
debug interface ge?	Enable IP packet tracing for the specified Gigabit Ethernet interface.

show debug scsirouter

To display a variety of debug information or perform specific troubleshooting activities for SCSI routing instances, use the **show debug scsirouter** command.

show debug scsirouter {*name* | **all**} {**scsitrace** | **tfemapping** | **tfestatus**}

show debug scsirouter *name* **tfestatus verbose**

show debug scsirouter *name* **target** *name* [**lun** *nn* [**scsitrace**]]

show debug scsirouter *name* **iscsitrace** [**hex** [**ascii**]] [**first** *nn* | **last** *nn*]

show debug scsirouter *name* **iscsitrace stats**

Syntax Description

scsirouter *name*	The name of the SCSI routing instance.
all	Display information for all SCSI routing instances.
scsitrace	Display raw SCSI trace information for the specified SCSI routing instance or target and LUN combination.
tfemapping	Display target to physical device mapping information.
tfestatus	Display the status of the trace configuration for the specified SCSI routing instance.
verbose	Display detailed information (including management, target management and LUN management tables for all initiators) about the status of the trace configuration for the specified SCSI routing instance.
target *name*	The name of the target associated with the specified SCSI routing instance.
lun *nn*	The target LUN number.
iscsitrace	Display iSCSI trace facility output.
hex	Display iSCSI trace data in hex.
ascii	Display iSCSI trace data in hex and ASCII.
first *nn*	Display the specified number of Protocol Data Units (PDUs) from the start of the trace.
last *nn*	Display the specified number of PDUs from the end of the trace.
stats	Display iSCSI trace statistics.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.
3.3.1	The **iscsitrace**, **hex**, **ascii**, **first**, **last** and **stats** keywords were added.

Usage Guidelines

To enable trace facilities for debugging SCSI routing instances, use the **debug scsirouter** command. The **show debug scsirouter** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following example displays TFE status data for the SCSI routing instance named *foo*:

```
[SN5428-2_PR]# show debug scsirouter foo tfestatus
```

The following is example output displaying the target to physical device mapping information for the SCSI routing instance named *zeus*:

```
[SN5428-2A]# show debug scsirouter zeus tfemapping

TARGET:0x0:chimaera_apps addressMapType=MAP_TYPE_LUNMAP (lun mapping)
   LUN:0x11: iSCSI2ByteLun=0x11, iScsiLun=0x0000000000000000, addressMapType=MAP_TYPE_WWNN
       Lun ID Length=8 lun ID=0x200000204819137b 00
     I: NO iSCSI Initiators Logged into target:0x0:chimaera_apps
   LUN:0x18: iSCSI2ByteLun=0x18, iScsiLun=0x0000000000000000,
addressMapType=MAP_TYPE_WWPN_LUN
     WWPN=0x22000020 0x37281505, secWWPN=0x22000020 0x37191505
     I: NO iSCSI Initiators Logged into target:0x0:chimaera_apps
   LUN:0x1f: iSCSI2ByteLun=0x1f, iScsiLun=0x0000000000000000,
addressMapType=MAP_TYPE_WWPN_LUN
     WWPN=0x22000020 0x37447b0e, secWWPN=0x22000020 0x37559b0e
     I: NO iSCSI Initiators Logged into target:0x0:chimaera_apps

TARGET:0x1:chimaera_eng addressMapType=MAP_TYPE_LUNMAP (lun mapping)
   LUN:0x11: iSCSI2ByteLun=0x11, iScsiLun=0x0000000000000000, addressMapType=MAP_TYPE_WWNN
       Lun ID Length=8 lun ID=0x20000004cf4304cd 00
     I: NO iSCSI Initiators Logged into target:0x1:chimaera_eng

TARGET:0x2:pegasus_web addressMapType=MAP_TYPE_LUNMAP (lun mapping)
   LUN:0x3: iSCSI2ByteLun=0x3, iScsiLun=0x0000000000000000,
addressMapType=MAP_TYPE_SERIAL_NUMBER
      lunSerialNumber=LS09311I0000I947ZDB5
     I: NO iSCSI Initiators Logged into target:0x2:pegasus_web

TARGET:0x3:pegasus_email addressMapType=MAP_TYPE_WWPN (target mapping)
       WorldWidePortName = 0x22000020 0x371912da, Secondary WorldWidePortName 0x22000020
0x371912da
   LUN:0x0: iSCSI2ByteLun=0x0, iScsiLun=0x0000000000000000,
addressMapType=MAP_TYPE_WWPN_LUN
     WWPN=0x22000020 0x371912da, secWWPN=0x22000020 0x372642da
     I: NO iSCSI Initiators Logged into target:0x3:pegasus_email
```

The following example of an iSCSI trace display for connections to and from the SCSI routing instance named *sr1* shows a simple login exchange. The display is formatted in hex and ASCII.

```
[SN5428-2A]# show debug scsirouter sr1 iscsitrace hex ascii
 1: 10.1.50.12:1912 -> 10.1.50.100:3260, len 252, time 0.000
 0000: 43 87 00 00 00 00 00 cb 33 39 63 35 00 00 00 00  C.......39c5....
 0010: 00 01 00 00 00 01 00 00 00 00 00 01 00 00 00 00  ................
 0020: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
 0030: 54 61 72 67 65 74 4e 61 6d 65 3d 69 71 6e 2e 31  TargetName=iqn.1
 0040: 39 38 37 2d 30 35 2e 63 6f 6d 2e 63 69 73 63 6f  987-05.com.cisco
 0050: 3a 30 30 2e 36 62 39 35 65 39 33 64 62 62 30 39  :00.6b95e93dbb09
 0060: 2e 74 31 00 4d 61 78 52 65 63 76 44 61 74 61 53  .t1.MaxRecvDataS
 0070: 65 67 6d 65 6e 74 4c 65 6e 67 74 68 3d 30 78 31  egmentLength=0x1
 0080: 30 30 30 30 00 49 6e 69 74 69 61 6c 52 32 54 3d  0000.InitialR2T=
 0090: 4e 6f 00 49 6e 69 74 69 61 74 6f 72 4e 61 6d 65  No.InitiatorName
 00a0: 3d 69 73 63 73 69 2e 63 69 73 63 6f 2e 64 61 76  =iscsi.cisco.dav
```

```
00b0: 61 76 68 6f 2d 6c 6e 78 2e 63 69 73 63 6f 2e 63  avho-lnx.cisco.c
00c0: 6f 6d 00 49 6e 69 74 69 61 74 6f 72 41 6c 69 61  om.InitiatorAlia
00d0: 73 3d 64 61 76 61 76 68 6f 2d 6c 6e 78 2e 63 69  s=davavho-lnx.ci
00e0: 73 63 6f 2e 63 6f 6d 00 53 65 73 73 69 6f 6e 54  sco.com.SessionT
00f0: 79 70 65 3d 6e 6f 72 6d 61 6c 00 00              ype=normal..

2: 10.1.50.100:3260 -> 10.1.50.12:1912, len 132, time 0.000
0000: 23 87 00 00 00 00 00 54 33 39 63 35 00 00 00 01  #......T39c5....
0010: 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 01  ................
0020: 00 00 00 07 00 00 00 00 00 00 00 00 00 00 00 00  ................
0030: 54 61 72 67 65 74 50 6f 72 74 61 6c 47 72 6f 75  TargetPortalGrou
0040: 70 54 61 67 3d 31 00 4d 61 78 52 65 63 76 44 61  pTag=1.MaxRecvDa
0050: 74 61 53 65 67 6d 65 6e 74 4c 65 6e 67 74 68 3d  taSegmentLength=
0060: 35 32 34 32 38 38 00 49 6e 69 74 69 61 6c 52 32  524288.InitialR2
0070: 54 3d 4e 6f 00 54 61 72 67 65 74 41 6c 69 61 73  T=No.TargetAlias
0080: 3d 74 31 00                                      =t1.
```

Related Commands

Command	Description
debug scsirouter	Enable debugging for the named SCSI routing instance.
debug scsirouter iscsitrace	Enable iSCSI trace facilities for debugging connections to and from the specified SCSI routing instance.
debug scsirouter target	Enable debugging for a specific SCSI routing instance target and LUN combination.

show devices

To display a list of devices found on the SN 5428-2 Storage Router Fibre Channel (FC) network, use the **show devices** command.

show devices [all | brief]

show devices [*fc?***] [lunid | serial]**

show devices rediscover

Syntax Description

all	(Optional) Keyword used to display information for all devices on all FC interfaces.
brief	(Optional) Keyword used to limit the display to serial number information, including vendor and product, for all devices on all FC interfaces.
fc?	(Optional) Limit the display to devices on the named FC interface. Valid values are fc1 through fc8. When you type the **show devices fc?** command, the CLI lists the interfaces available. You cannot specify a nonexistent interface.
lunid	(Optional) Keyword used to limit the display to LUN information for the devices on the specified interface or all FC interfaces.
serial	(Optional) Keyword used to limit the display to serial number information, including vendor and product, for devices on the specified interface or all FC interfaces.
rediscover	(Optional) Begin a new discovery process on the FC network

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display information about all devices discovered on the named FC interface, or all FC interfaces. This information can be used when assigning targets to SCSI routing instances. The storage information includes the associated interface, WWPN, port ID, device type, LUN number, LUN ID type and LUN ID, capacity, vendor, product name, and LUN serial number.

The output of this command is limited to devices that are visible to the FC initiator interfaces (fci1 and fci2).

Use the **rediscover** keyword to clear the existing list of devices and begin a new discovery process on the FC network. Issue the **show devices** command again to display all discovered devices.

Caution The **show devices rediscover** command flushes existing tables and forces a PLOGI to each device. If IP hosts are accessing a device, they will be required to wait until this process completes.

Examples

The following is example output from the **show devices rediscover** command, followed by the **show devices** command:

```
[SN5428-2A]# show devices rediscover
Fibre channel discovery kicked off!

[SN5428-2A]# show devices
Fabric Attached Devices detected
Interface WWPN             PortId   Device Type  Lun   Lunid Type        Lunid
--------- ---------------- -------- ------------ ----- ----------------- -----
fc1       22000003be3203bc 0x101e2  Disk         0     IEEE Extended     20000003be3203bc
fc1       2200001026448a0d 0x101e1  Disk         0     IEEE Extended     2000001026448a0d

Lun Description Table
Interface WWPN             Lun   Capacity Vendor       Product    Serial
--------- ---------------- ----- -------- ------------ ---------- ------
fc1       22000003be3203bc 0     17GB     SEAGATE      ST207341EB 2DU0537A00006105FGJ6
fc1       2200001026448a0d 0     17GB     SEAGATE      ST207340EB 1BB00L3J0000600256DW
```

Table 12-26 describes the fields shown in the display.

Table 12-26 Description of Fields in the "show devices" Command Output

Field	Description
Interface	The FC interface associated with the storage.
WWPN	World Wide Port Name (WWPN) address.
Port Id	The port and domain ID, in hex.
Device Type	The type of physical device, for example Disk.
Lun	The physical LUN associated with the storage.
Lunid Type	The type of LUN, for example IEEE Extended.
Lunid	The unique LUN identifier, assigned when the LUN is discovered by the FC interface.
Lun Description Table	Information about the physical LUN.
Interface	The FC interface associated with the storage.
WWPN	WWPN address.
Lun	The physical LUN associated with the storage.
Capacity	The size of the storage resource, if applicable.
Vendor	The vendor of the storage resource.
Product	The product identifier.
Serial	The serial number of the storage resource.

The following is example output from the **show devices brief** command, which displays the LUN description table:

```
[SN5428-2A]# show devices brief
Lun Description Table
Interface WWPN             Lun   Capacity Vendor       Product    Serial
--------- ---------------- ----- -------- ------------ ---------- --------------------
fc1       22000003be3203bc 0     17GB     SEAGATE      ST207341EB 2DU0537A00006105FGJ6
fc1       2200001026448a0d 0     17GB     SEAGATE      ST207340EB 1BB00L3J0000600256DW
```

The following is example output from the **show devices lunid** command:

```
[SN5428-2A]# show devices lunid
Fabric Attached Devices detected
Interface WWPN             PortId   Device Type  Lun   Lunid Type        Lunid
--------- ---------------- -------- ------------ ----- ----------------- ------------------
fc1       22000003be3203bc 0x101e2  DASD         0     IEEE Extended     20000003be3203bc
fc1       2200001026448a0d 0x101e1  DASD         0     IEEE Extended     2000001026448a0d
```

Related Commands

Command	Description
show fcswitch	Display global configuration information for storage router FC interfaces.
show interface	Display operational and configuration information about the specified interface or all interfaces.
show scsirouter	Display configuration and operational information about the named SCSI routing instance.

show diagnostics

To show that the hardware passed diagnostic tests on startup, use the **show diagnostics** command.

show diagnostics

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **show diagnostics** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example output from the **show diagnostics** command:

```
[SN5428-2A]# show diagnostics
SN5428-2 Hardware Diagnostics Passed.
```

Related Commands

Command	Description
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show fcalias

To display information about aliases and their members, use the **show fcalias** command.

show fcalias {*alias-name* | **all** | **brief**}

Syntax Description

alias-name	The name of a specific alias entity. Only information about this alias entity will be displayed.
all	Display information about all alias entities.
brief	Show member information only for all alias entities.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

An alias is a collection of Fibre Channel (FC) devices, such as switches, initiators, storage and other SN 5428-2 Storage Routers, that can be zoned together. An alias is not a zone and cannot include a zone or another alias as a member.

Use the **show fcalias** command to display a list of members and member types for the specified alias. Use the **brief** keyword to limit the display to a list of members only.

A default alias of *iscsi* is provided that contains both initiators WWPN1 and WWPN2.

Examples

The following is example output from the **show fcalias brief** command:

```
[SN5428-2A]# show fcalias brief
Alias Name           Member value
-------------------- ------------
iscsi                280000048aa58710
                     290000048aa58710
labgroupa            201c00591575c229
                     201b00491585c210
webservices          2201c723591b2038
                     202100491585d220
                     202a00491585f310

3 Aliases
```

Related Commands

Command	Description
delete fcalias	Delete the named alias or the specified alias member.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

show fcip

To display configuration information and operational statistics related to the named FCIP instance or all instances, use the **show fcip** command.

show fcip {*name* | **all**} **[from** {*filename* | **bootconfig** | **runningconfig**}**]**

show fcip {*name* | **all**} **[brief** | **stats]**

Syntax Description

name	The name of the FCIP instance. Valid names are *fcip1* and *fcip2*.
all	Display the requested information for all FCIP instances.
from *filename*	(Optional) The name of the saved configuration file containing the specified FCIP instance information. This file must exist in the *savedconfig* directory.
from bootconfig	(Optional) Display the requested configuration information from the persistent saved configuration.
from runningconfig	(Optional) Display the requested configuration information from the currently running configuration.
brief	(Optional) Display status and brief configuration information.
stats	(Optional) Display accumulated operational information for the FCIP instance. This display shows statistics accumulated since the named FCIP instance became active or statistics were last cleared, whichever is more recent.

Defaults

When no **from** parameters are specified, the information displayed is from the currently running configuration.

Command Modes

Administrator or Monitor

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

The **show fcip** command displays the current link state, connection state, Fibre Channel firmware version and state, packet trace mask and mailbox trace state. This command also show protocol specific connection information, such as current TCP window sizes or the raw IP flow control and error statistics.

Use the **stats** keyword to display accumulated operational information of the specified FCIP instance. Operational statistics include the number of Fibre Channel link changes, network connects, asynchronous events, and Fibre Channel errors.

Examples

The following is example output from the show fcip command. In this example, the FCIP instance is configured to use a raw IP connection.

```
[SN5428-2A]# show fcip fcip1
Instance  Device I/F  Network I/F
--------  ----------  --------------
fcip1     fci1        ge1 10.1.0.16

Description
-----------
Accessing SAN island 5

Destination   Mode       IpAddress        IsConnected
-----------   ---------  ---------------  -----------
dest1         raw        10.2.70.110      TRUE

LinkState
---------
UP

fcip1 Trace Status
------------------
pktTraceMask                On, mask 0xffff
mboxTracing                 On
mboxCmdCount                0

fcip1 Connection Information
----------------------------
idlePingDelay               60
txAck                       0x38
txSeq                       0x39
rxAck                       0x38
rxSeq                       0x38
peerNeedsAck                0x0
WackQ                       0x0, 0xca69d08
WackQCnt                    0x0
WackQExtra                  0x0
frOut                       0x0
frOutHiWater                0x400
bcOut                       0x0
bcOutHiWater                0x200000
burstOut                    0x0
burstOutHiWater             0x200000
outFlowCtrlQ                0x0, 0x0
frIn                        0x0
frInHiWater                 0x2b0
inFlowCtrlQ                 0x0, 0x0
blockMaxSize                0x0
oosPktQ                     0x0, 0x0
ipProtocol                  0x4
reXmitCnt                   0x4
reXmitMaxTO                 0x30
reXmitTimeOutIncr           0x0
reXmitInitialTimeOut        0x0
reXmitTotalTimeOut          0x0
 192ms 256ms 384ms 768ms
```

The following is example output from the show fcip command. In this example, the FCIP instance is configured to use a TCP server connection.

```
[SN5428-2A]# show fcip fcip2

Instance  Device I/F  Network I/F
--------  ----------  -----------
fcip2     fci2        ge2  10.1.40.42

Description
-----------
Testing SAN

Destination   LocalMode  IpAddress        IsConnected
-----------   ---------  ---------------  -----------
dest2         tcpserver  10.2.50.51       TRUE

LinkState
---------
UP

fcip1 Trace Status
------------------
pktTraceMask                On, mask 0xffff
mboxTracing                 On
mboxCmdCount                0

fcip1 Connection Information
----------------------------
idlePingDelay               60
tcpPort                     3225
rxTcpWindowSize             262144
maxRxTcpWindowSize          262144
txTcpWindowSize             262080
txTcpCongestionWindowSize   268800
maxTxTcpWindowSize          262144
frIn                        0
frInHiWater                 688
```

Table 12-27 describes the fields in the display:

Table 12-27 Description of Fields in the "show fcip" Command Output

Field	Description
Instance	The name of the FCIP instance.
Device I/F	The internal Fibre Channel interface associated with this FCIP instance.
Network I/F	The Gigabit Ethernet interface and IP address associated with this FCIP instance.
Description	The FCIP instance description, if any.
Destination	The name of the FCIP peer destination.
Mode	The connection protocol type used by this FCIP instance.
IpAddress	The IP address of the peer FCIP instance.
IsConnected	The state of the connection between this FCIP instance and its peer.
LinkState	The state of the link.

Table 12-27 Description of Fields in the "show fcip" Command Output (continued)

Field	Description
Trace Status	Operational information about FCIP traces.
pktTraceMask	The trace mask.
mboxTracing	Indicates if tracing is turned on for the FCIP instance.
mboxCmdCount	The number of commands that have been traced.
Connection Information	Configuration and operational information about the FCIP instance connection to the peer.
idlePingDelay	The number of seconds before a keep-alive packet is sent across an idle connection.
txAck	The number of the last transmitted acknowledgement (ACK).
txSeq	The last transmitted sequence number.
rxAck	The number of the last received ACK.
rxSeq	The last received sequence number.
peerNeedsAck	The current number of unacknowledged frames.
WackQ	The head and tail pointers of non-acknowledged packets.
WackQCnt	The total number of packets waiting for ACKs.
WackQExtra	The number of packets acknowledged but not returned from the Gigabit Ethernet driver.
frOut	The number of Fibre Channel (FC) frames that have been transmitted on the Gigabit Ethernet interface, but not yet acknowledged.
frOutHiWater	The maximum number of frames that can be outstanding on a raw IP connection.
bcOut	The total number of FC octets transmitted on the Gigabit Ethernet interface, but not yet acknowledged.
bcOutHiWater	The maximum number of bytes that can be outstanding on a raw IP connection.
burstOut	The number of bytes given to the Gigabit Ethernet interface, but not returned.
burstOutHiWater	The maximum number of bytes that can be transmitted on a raw IP connection.
outFlowCtrlQ	The head and tail pointers of queued packets waiting on Gigabit Ethernet transmit flow control.
frIn	The number of FC frames given to the FC interface.
frInHiWater	The maximum number of frames, received from a raw IP connection, that can be sent to the FC interface.
inFlowCtrlQ	The head and tail pointers of queued packets waiting on FC transmit flow control.
blockMaxSize	The maximum block size, if blocking FC frames.
oosPktQ	The head and tail pointers of packets received out-of-sequence, waiting for in- sequence packets.

Table 12-27 Description of Fields in the "show fcip" Command Output (continued)

Field	Description
ipProtocol	The value of the IP protocol used in the IP header.
reXmitCnt	The maximum number of times a packet can be retransmitted, before it is discarded.
reXmitMaxTO	The maximum amount of time, in ticks, that can be used for any one retransmission, before the packet is discarded.
reXmitTimeOutIncr	The amount of time, in ticks, to add to a packet's time out value before retransmitting the packet
reXmitInitialTimeOut	The initial amount of time, in ticks, to delay before retransmitting a packet.
reXmitTotalTimeOut	The maximum amount of time, in ticks, that a packet is kept alive, before it is discarded.
Millisecond values	The retransmission intervals, based on the error recovery algorithm.
tcpPort	The TCP port number. The TCP server listens to this port; the TCP client connects to this port.
rxTcpWindowSize	The current maximum number of outstanding bytes that can be received on a TCP connection.
maxRxTcpWindowSize	The configured maximum number of outstanding bytes that can be received on a TCP connection.
txTcpWindowSize	The configured maximum number of outstanding bytes that can be transmitted on a TCP connection.
txTcpCongestionWindowSize	The size of the congestion controlled window, in bytes.
maxTxTcpWindowSize	The current maximum number of outstanding bytes that can be transmitted on a TCP connection. This is the largest window that the peer has offered.

The following is example output from the **show fcip brief** command:

```
[SN5428-2A]# show fcip fcip1 brief
Instance  Device I/F  Network I/F
--------  ----------  --------------
fcip1     fci1        ge1 10.1.0.16

Description
-----------
Accessing SAN island 5

Destination   Mode       IpAddress        IsConnected
-----------   ---------  ---------------  -----------
dest1         tcpclient  10.2.70.110      TRUE

LinkState
---------
UP
```

The following is example output from the **show fcip stats** command:

```
[SN5428-2A]# show fcip all stats
fcip1
-----
Mode                                tcpclient
Destination Address                 10.1.40.170
Connected                           Yes

fcip1 Stats
-----------
Link up events                      1
Link down events                    0
Connect events                      1
Network connections established     1
Network flow controlled             1
fcip2
-----
Mode                                raw
Destination Address                 10.1.50.53
Connected                           Yes

fcip2 Stats
-----------
Link up events                      1
Link down events                    0
Connect events                      1
Network connections established     1
Network flow controlled             1
```

Related Commands

Command	Description
clear counters fcip	Reset accumulated operational statistics for the specified SCSI routing instance.
fcip	Create an FCIP instance.
fcip description	Add user-defined identification information to the named FCIP instance.
fcip destination config	Configure operational parameters for the named FCIP instance.
fcip destination raw	Add a peer destination to the named FCIP instance, with a connection type of raw IP.
fcip destination tcpclient	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance initiates the TCP connection.
fcip destination tcpserver	Add a peer destination to the named FCIP instance, with a connection type of TCP/IP. The named FCIP instance listens for the TCP connection from the named destination.
fcip networkif	Assign a Gigabit Ethernet interface and IP address to the named FCIP instance.
restore fcip	Restore the named SCSI routing instance from the named configuration file.
save fcip	Save configuration information for the named FCIP instance.

show fcswitch

To display global configuration information for SN 5428-2 Storage Router Fibre Channel (FC) interfaces, use the **show fcswitch** command.

show fcswitch

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command displays global configuration information, including error detect timeout value and resource allocation timeout value, for all FC interfaces.

Examples

The following example displays global configuration information for all FC interfaces:

```
SN5428-2A]# show fcswitch
Global attributes                    Value
-----------------------------------  -----
Domain ID                            1
Domain ID lock                       disabled
Active Zoneset                       None
Zoning Merge                         SW2
Zoning Default                       All
Zoning Autosave                      enabled
Distributed Services timeout (dstov) 5000
Fabric Services timeout (fstov)      1000
Error Detect timeout (edtov)         2000
Resource Allocation timeout (ratov)  10000
Buffer to Buffer Credit (interop)    12
Initiator WWPN1                      280000023e081120
Initiator WWPN2                      290000023e081120
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or delete the entire named zone set from the zoning database.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show fcswitch eport	Display FSPF protocol information.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show fcswitch global-nameserver	Display the Fibre Channel fabric nameserver database.
show fcswitch linkstate	Display information about the storage router link state database.
show fcswitch nameserver	Display the local Fibre Channel nameserver database.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

show fcswitch eport

To display Fabric Shortest Path First (FSPF) protocol information for the Fibre Channel (FC) fabric, use the **show fcswitch eport** command.

show fcswitch eport {all | brief}

Syntax Description

all	Display complete FSPF information for all switches in the fabric.
brief	Display abbreviated FSPF information for all switches in the fabric.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to show FSPF information for all switches in the fabric.

Examples

The following is example output from the **show fcswitch eport brief** command:

```
[SN5428-2A]# show fcswitch eport brief
Domain Id Node WWN           Source Port Hops Cost  Age   Incarnation Links

--------- ------------------ ----------- ---- ----- ----- ----------- ----

99        100000059ba69821   255         0     0    580   80000024    0

1 entry found
```

Table 12-28 describes the fields in the display:

Table 12-28 Description of Fields in the "show fcswitch eport brief" Command Output

Field	Description
Domain Id	The domain ID of the SN 5428-2 Storage Router or switch in the fabric.
Node WWN	The node's World Wide Name.
Source Port	The node's source port number.
Hops	The number of hops to the specified node.
Cost	The calculated cost.
Age	The age of the entry.

Table 12-28 Description of Fields in the "show fcswitch eport brief" Command Output (continued)

Field	Description
Incarnation	The link state incarnation number.
Links	The number of links associated with this node.

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch enable	Enable all FC interfaces.
restore fcswitch	Restore Fibre Channel configuration information from the named configuration file.
save fcswitch	Save all Fibre Channel configuration, including global configuration settings and zoning information.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show fcswitch linkstate	Display information about the storage router link state database.

show fcswitch fabric

To display information about the Fibre Channel (FC) fabric, use the **show fcswitch fabric** command.

show fcswitch fabric {all | brief}

Syntax Description

all	Display complete information for all domains in the fabric.
brief	Display abbreviated information for all domains in the fabric.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display all nodes available in the fabric, along with associated domain ID and node ID.

Examples

The following is output from the **show fcswitch fabric brief** command:

```
[SN5428-2A]# show fcswitch fabric brief
Domain Id Node Id WWN
--------- ------- --------------------------------
99        fffc4f  100000059ba69821
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or delete the entire named zone set from the zoning database.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.
show fcswitch global-nameserver	Display the Fibre Channel fabric nameserver database.
show fcswitch linkstate	Display information about the storage router link state database.
show fcswitch nameserver	Display the local Fibre Channel nameserver database.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

show fcswitch global-nameserver

To display the Fibre Channel (FC) fabric nameserver database, use the **show fcswitch global-nameserver** command.

show fcswitch global-nameserver {all | brief}

Syntax Description

all	Display the fabric nameserver database.
brief	Display abbreviated information from the fabric nameserver database.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

All devices in a fabric are assigned a unique 24-bit public address by the fabric. The fabric also maintains a database of all the devices and their addresses. The database is called the fabric *nameserver*, and is used by host connections to determine the devices that they can communicate with.

Use this command to display the fabric nameserver database.

Examples

The following is example output from the **show fcswitch global-nameserver brief** command. A table of information, including domain ID, displays for each switch in the fabric.

```
[SN5428-2A]# show fcswitch global-nameserver brief
domainId = 1

Port Id Port Type Port Number     Port WWN          Port IP Address
------- -------   --------------- ----------------- -----------------
010000  N         0               280000054227b610  00000000
0105c1  NL        5               21000003be64e2aa  00000000
0105c2  NL        5               21000003be64e2ac  00000000
0105c3  NL        5               21000003be3a6dc1  00000000
0105c4  NL        5               21000003be64e03b  00000000
0105c5  NL        5               21000003be64e25c  00000000
0105c6  NL        5               21000003be64e252  00000000
010f00  N        15               290000054227b610  00000000

8 entries found for domain id 1
```

```
domainId = 239

Port Id Port Type Port Number     Port WWN         Port IP Address
------- -------   --------------- ---------------- -----------------
ef0000  N         Unknown         280000012c061100 00000000
ef02ef  NL        Unknown         210000d07a031e24 00000000
ef04d1  NL        Unknown         21000003be64e2a5 00000000
ef04d2  NL        Unknown         21000003be64e22e 00000000
ef04d3  NL        Unknown         21000003be64e2a2 00000000
ef04d4  NL        Unknown         21000003be64e225 00000000
ef04d5  NL        Unknown         21000003be64e206 00000000
ef04d6  NL        Unknown         21000003be64e220 00000000
ef04d9  NL        Unknown         21000003be64e22a 00000000
ef04da  NL        Unknown         21000003be64e2a8 00000000
ef04dc  NL        Unknown         2100001026b4105d 00000000
ef04e0  NL        Unknown         2100001026b4087a 00000000
ef0f00  N         Unknown         290000021c061100 00000000

13 entries found for domain id 239
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or delete the entire named zone set from the zoning database.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show fcswitch linkstate	Display information about the storage router link state database.
show fcswitch nameserver	Display the local Fibre Channel nameserver database.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

show fcswitch linkstate

To display information about the SN 5428-2 Storage Router link state database, use the **show fcswitch linkstate** command.

show fcswitch linkstate database

Syntax Description

database	Display current link information for all Fibre Channel (FC) ports.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display link state information for each FC interface, including the initiator interfaces (fc0 and fc15).

Examples

The following is output from the **show fcswitch linkstate** command:

```
[SN5428-2A]# show fcswitch linkstate database
Local Node WWN       100000059ba69821
Local Port           15
Local Port WWN       200f00059ba69821
Remote Node WWN      100000059ba69820
Remote Port          ffffffff
Remote Port WWN      290000059ba69820
Remote Agent Address 00000000
Remote Agent Type    0
Remote Agent Port    0
Remote Unit Type     Unknown
Remote Connection Id 0000ef

Local Node WWN       100000059ba69821
Local Port           0
Local Port WWN       200000059ba69821
Remote Node WWN      100000059ba69820
Remote Port          ffffffff
Remote Port WWN      280000059ba69820
Remote Agent Address 00000000
Remote Agent Type    0
Remote Agent Port    0
Remote Unit Type     Unknown
Remote Connection Id 4f0000
```

```
Local Node WWN       100000059ba69821
Local Port           1
Local Port WWN       200100059ba69821
Remote Node WWN      2000002037559b0e
Remote Port          ffffffff
Remote Port WWN      2200002037559b0e
Remote Agent Address 00000000
Remote Agent Type    0
Remote Agent Port    0
Remote Unit Type    Unknown
Remote Connection Id 0000e1

Local Node WWN       100000059ba69821
Local Port           1
Local Port WWN       200100059ba69821
Remote Node WWN      20000004cf4304cd
Remote Port          ffffffff
Remote Port WWN      22000004cf4304cd
Remote Agent Address 00000000
Remote Agent Type    0
Remote Agent Port    0
Remote Unit Type     Unknown
Remote Connection Id 0000e2

Local Node WWN       100000059ba69821
Local Port           15
Local Port WWN       200f00059ba69821
Remote Node WWN      100000059ba69820
Remote Port          ffffffff
Remote Port WWN      290000059ba69820
Remote Agent Address 00000000
Remote Agent Type    0
Remote Agent Port    0
Remote Unit Type     Unknown
Remote Connection Id 4f0f00

5 entries found
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or delete the entire named zone set from the zoning database.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show fcswitch global-nameserver	Display the Fibre Channel fabric nameserver database.
show fcswitch nameserver	Display the local Fibre Channel nameserver database.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

show fcswitch nameserver

To display the local Fibre Channel (FC) nameserver database, use the **show fcswitch nameserver** command.

show fcswitch nameserver {all | brief}

Syntax Description

all	Display the local fabric nameserver database.
brief	Display abbreviated information from the local fabric nameserver database.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

All devices in a fabric are assigned a unique 24-bit public address by the fabric. The fabric also maintains a database of all the devices and their addresses. The database is called the fabric *nameserver*, and is used by host connections to determine the devices that they can communicate with.

Use this command to display the local fabric nameserver database.

Examples

The following is example output from the **show fcswitch nameserver brief** command:

```
[SN5428-2A]# show fcswitch nameserver brief
Port Id Port Type Port Number     Port WWN          Port IP Address
------- -------   --------------- ----------------- --------------------------------
4e0000  N         0               280000048aa58710  00000000
4e01d1  NL        1               2200001026448a0d  00000000
4e01d2  NL        1               22000003be3203bc  00000000
4e0e00  N         15              290000048aa58710  00000000

4 entries found
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or delete the entire named zone set from the zoning database.
fcswitch domainid	Set the domain ID for the storage router, to be used for FC switched fabric zoning.
fcswitch dstov	Specify the amount of time the storage router is to wait for Fibre Channel Distributed Services.
fcswitch edtov	Specify an error detect timeout value for all Fibre Channel interfaces.
fcswitch enable	Enable all FC interfaces.
fcswitch fstov	Specify the fabric stability timeout value.
fcswitch interop-credit	Set the data buffer credit capacity for all FC ports.
fcswitch ratov	Specify a Fibre Channel resource allocation timeout value for the storage router.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch eport	Display FSPF protocol information.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show fcswitch global-nameserver	Display the Fibre Channel fabric nameserver database.
show fcswitch linkstate	Display information about the storage router link state database.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

show ha

To display HA configuration and status information and HA statistics for the SN 5428-2 Storage Router or selected applications and SCSI routing instances running in the HA environment, use the **show ha** command.

show ha all

show ha app {all | list} stats

show ha app *nn* **{stats | failover list}**

show ha node stats

Syntax Description

all	Display brief HA status and configuration information.
app all stats	Show HA statistics for all applications.
app list stats	Display a list of HA applications and brief HA statistics. This list includes application numbers.
app *nn* **stats**	Display HA statistics for the specified application number.
app *nn* **failover list**	Display the failover list for the specified SCSI routing instance.
node stats	Generate a display of HA statistics for the storage router.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to help determine if there are communications problems within the high availability cluster. The **show ha all** command displays the state of the management and HA interfaces, and the status of the intelligent automatic failover feature.

To display statistics about all applications, issue this command:

```
[SN5428-2A]# show ha app all stats
```

To display a list of SCSI routing instances and other HA applications, with their creation dates and last time of fail over, issue this command:

```
[SN5428-2A]# show ha app list stats
```

Examples

The following is example output from the **show ha** command, using the **app list** keywords to display a list of applications and SCSI routing instances:

```
[SN5428-2A]# show ha app list stats

----------------------------HA APPLICATION LIST-------------------------


Type = cluster               Created = Tue Mar 19 17:08:02 CDT 2002
   (Number 01)   cluster/myCluster   Created = Tue Mar 19 17:08:03 CDT 2002
                                  Activated = Tue Mar 19 17:08:03 CDT 2002
                                Last Failover = no failover yet


Type = scsirouter           Created = Tue Mar 19 17:08:02 CDT 2002
   (Number 02)   scsirouter/myScsi1  Created = Wed Mar 20 16:36:02 CDT 2002
                                  Activated = Wed Mar 20 16:36:07 CDT 2002
                                Last Failover = no failover yet
   (Number 03)   scsirouter/myScsi1  Created = Wed Mar 20 18:20:14 CDT 2002
                                  Activated = Thu Mar 21 07:45:01 CDT 2002
                                Last Failover = Thu Mar 21 11:15:33 CDT 2002
------------------------------------------------------------------------------
```

Table 12-29 describes the significant fields shown in the display.

Table 12-29 Description of Fields in the "show ha" Command Output

Field	Description
Type	The type of HA application or service.
Created	The date and time that the application or service type was created.
Number	The HA application or service number. This number is used in the **show ha** command with the **app** keyword to display information about that specific application or service.
Created	The date and time that the specific application or service was created.
Activated	The date and time that the specific application or service became active.
Last Failover	The date and time that the specific application or service last failed over.

The following is example output from the **show ha** command, using the **app** *nn* **stats** keyword and parameter to display operational statistics about the SCSI routing instance named *foo*:

```
[SN5428-2A]# show ha app 02 stats

----------------------------HA APPLICATION Number 2---------------------
Application Name = scsirouter/foo
  Type =  scsirouter            Master Specifics:        DataBase:
  AppId =  0759e950              Node Id =  0042f1a7      ID =  597099c8
  State =  Master                 Preferred Slave =  No    Status =  Up to Date
  Eligibility = 00000003          Permanent Master =  No   Last Update =
                                                        Mon Apr  8 21:03:55 GMT 2002
                                                          Pndg ID = 00000000
                                                          Prev ID = 7b1d240d
```

```
HA Message Transmission Summary:
  Total = 00000005     Multicasts = 00000002     Unicasts = 00000003
  HA Message Reception Summary:
  Total = 00000004

            -------------------Message Breakdown------------------
             Message Types Received     Message Types Transmitted
     Master Requests =  00000002            Master Requests =  00000001
         Master Acks =  00000001                Master Acks =  00000002
           Elections =  00000001                  Elections =  00000001
            Refusals =  00000000                   Refusals =  00000000
           Conflicts =  00000000                  Conflicts =  00000000
            Resolves =  00000000                   Resolves =  00000000
               Quits =  00000000                      Quits =  00000000
       Resignations =  00000000               Resignations =  00000001
              Doas =  00000000                       Doas =  00000000
```

Table 12-30 describes the significant fields shown in the display.

Table 12-30 Description of Fields in the "show ha app" Command Output

Field	Description
Application Name	The complete name of the HA application. The syntax is *application-type/application name*.
Type	The HA application type.
AppId	The HA application identification number.
State	The state of the HA application.
Eligibility	The failover eligibility indicator.
Master Specifics: Node Id	The ID of the node that is currently running the HA application.
Preferred Slave	Indicates if the storage router is the first node on the failover list for this HA application.
Permanent Master	Indicates if the storage router is defined as the primary for the HA application.
Database: ID	The ID of the internal database entry associated with this HA application.
Status	Indicates if the database is current or if there is an outstanding configuration update pending.
Last Update	The date and time of the last update to this HA application.
HA Message Transmission Summary	The number of HA messages that have been transmitted by this application. The Total value is the sum of the Broadcasts and the Unicasts.

Table 12-30 Description of Fields in the "show ha app" Command Output (continued)

Field	Description
HA Message Reception Summary	The total number of HA messages received by this application.
Message Breakdown	The number of each type of HA message that has been received and transmitted by this HA application. The following are HA message types: • Master Requests • Master Acks • Elections • Refusals • Conflicts • Resolves • Quits • Resignations • Doas

Related Commands

Command	Description
failover eligibility	Enable intelligent automatic failover for all SCSI routing instances running on the storage router.
interface ha ip-address	Specify the HA interface IP address and subnet mask.
setup cluster	Change the configuration of the high availability environment.
show cluster	Display cluster-related operational statistics, including heartbeat information.
show interface	Display operational and configuration information for the specified interface or all interfaces.

show interface

To display operational characteristics and statistics for interfaces configured for the SN 5428-2 Storage Router, use the **show interface** command. Statistics are cumulative since the last time the system was started.

show interface

show interface brief [*expression*]

show interface {*if-name* | **all**} **[stats]**

show interface *if-name* **iscsilogins**

Syntax Description

brief	Show basic operational characteristics for all interfaces, including status, IP address, and selected options.
expression	(Optional) Limit the display to selected options that matches this expression.
if-name	Show basic operational characteristics and configuration data for the specified interface. Valid interface names are listed in Table 12-31.
all	Display operational and configuration data for all interfaces.
stats	(Optional) Show operational statistics, such as number of input and output packets, for the specified interface.
iscsilogins	Show iSCSI host logins for the specified interface. This keyword is only valid when the storage router is deployed for transparent SCSI routing.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

- Use the **show interface** command with no parameters to display the basic operational characteristics and configuration data for all interfaces.
- Use the **show interface brief** command to display basic operational characteristics for each of the interfaces. This display includes status (up or down) information for the interface and selected operational options such as type of interface, MTU size, and speed. Use the *expression* argument to limit the display to options that match the expression.

- Use the **show interface** *if-name* **stats** command to display operational statistics related to the specified interface. This information can include packets received and transmitted, collisions, octets, multicast packets, dropped and unsupported protocol, exception status IOCBs (such as LIP reset aborts, port unavailable or logged out, DMA errors, port configuration changed, command timeout, data overrun, write or read data underrun, and queue full), Fibre Channel (FC) errors, and other general events.

Table 12-31 Valid Interface Names

Interface Name	Description
fc*?*	The FC interface, for example fc1 or fc5.
fci*?*	The internal FC interface, for example fci1 or fci2.
ge*?*	The Gigabit Ethernet interface, for example, ge1 or ge2.
ha	The high availability interface.
mgmt	The management interface.

Examples

The following is example output from the **show interface** command:

```
[SN5428-2A]# show interface
Operational Data
Interface  Stat  IP/Netmask               MAC          Options
---------  ----  ------------------------ ------------ -------
lo0         up   127.0.0.1/ff000000       000000000000 type Loopback
                                                       mtu 32768
                                                       speed 0
                                                       flags UP LOOPBK RUNNING MLTCST
mgmt        up   10.1.10.244/ffffff00     00023d070cc0 type Ethernet
                                                       mtu 1500
                                                       speed 100000000
                                                       flags UP BRDCST RUNNING MLTCST
ha          up   10.1.20.56/ffffff00      00023d070cc1 type Ethernet
                                                       mtu 1500
                                                       speed 100000000
                                                       flags UP BRDCST RUNNING MLTCST
fei2        up   2.0.0.1/ffffff00         00065338bc22 type Ethernet
                                                       mtusize 1500
                                                       speed 100000000
                                                       flags UP BRDCST RUNNING MLTCST
fc0         up                                         type Fibre Channel
                                                       OperState enabled
                                                       PortID 010000
                                                       WWN 200000059ba69821
                                                       LinkSpeed 2Gb/s
                                                       LinkState Active
                                                       SyncState SyncAcquired
                                                       LoginStatus LoggedIn
                                                       Loopback Status Not Running
                                                       MaxCredit 12
                                                       DonatedToPort None
                                                       RunningType f-port
                                                       PendingType f-port
                                                       InBandMgmt enabled
                                                       SFPType NotApplicable
                                                       SFPVendor N/A
                                                       SFPVendorID N/A
                                                       SFPPartNumber N/A
                                                       SFPRev N/A
```

```
fc1          up                                type Fibre Channel
                                               OperState enabled
                                               PortID 010100
                                               WWN 200100c0aa00bc30
                                               LinkSpeed 1Gb/s
                                               LinkState Active
                                               SyncState SyncAcquired
                                               LoginStatus LoggedIn
                                               Loopback Status Not Running
                                               MaxCredit 12
                                               DonatedToPort None
                                               RunningType fl-port
                                               PendingType gl-port
                                               InBandMgmt enabled
                                               SFPType 100-M5-SN-1
                                               SFPVendor PICOLIGHT
                                               SFPVendorID 850400
                                               SFPPartNumber PL-XPL-00-S23-00
                                               SFPRev
fc2          down                              type Fibre Channel
                                               OperState disabled
                                               PortID 010200
                                               WWN 200200c0cc00ac30
                                               LinkSpeed auto
                                               LinkState Inactive
                                               SyncState SyncLost
                                               LoginStatus NotLoggedIn
                                               Loopback Status Not Running
                                               MaxCredit 12
                                               DonatedToPort None
                                               RunningType Unknown
                                               PendingType gl-port
                                               InBandMgmt enabled
                                               SFPType NotInstalled
                                               SFPVendor Unknown
                                               SFPVendorID 0
                                               SFPPartNumber Unknown
                                               SFPRev 0
fc3          down                              type Fibre Channel
                                               OperState disabled
                                               PortID 010300
                                               WWN 200300c0cc00ac30
                                               LinkSpeed auto
                                               LinkState Inactive
                                               SyncState SyncLost
                                               LoginStatus NotLoggedIn
                                               Loopback Status Not Running
                                               MaxCredit 12
                                               DonatedToPort None
                                               RunningType Unknown
                                               PendingType gl-port
                                               InBandMgmt enabled
                                               SFPType NotInstalled
                                               SFPVendor Unknown
                                               SFPVendorID 0
                                               SFPPartNumber Unknown
                                               SFPRev 0
fc4          down                              type Fibre Channel
                                               OperState disabled
                                               PortID 010400
                                               WWN 200400c0bb00ac30
                                               LinkSpeed auto
                                               LinkState Inactive
                                               SyncState SyncLost
```

```
                                                LoginStatus NotLoggedIn
                                                Loopback Status Not Running
                                                MaxCredit 12
                                                DonatedToPort None
                                                RunningType Unknown
                                                PendingType gl-port
                                                InBandMgmt enabled
                                                SFPType NotInstalled
                                                SFPVendor Unknown
                                                SFPVendorID 0
                                                SFPPartNumber Unknown
                                                SFPRev 0
fc5             down                            type Fibre Channel
                                                OperState disabled
                                                PortID 010500
                                                WWN 200500c0dd00bc30
                                                LinkSpeed auto
                                                LinkState Inactive
                                                SyncState SyncLost
                                                LoginStatus NotLoggedIn
                                                Loopback Status Not Running
                                                MaxCredit 12
                                                DonatedToPort None
                                                RunningType Unknown
                                                PendingType fl-port
                                                InBandMgmt enabled
                                                SFPType NotInstalled
                                                SFPVendor Unknown
                                                SFPVendorID 0
                                                SFPPartNumber Unknown
                                                SFPRev 0
fc6             down                            type Fibre Channel
                                                OperState disabled
                                                PortID 010600
                                                WWN 200600c0ad00cc30
                                                LinkSpeed auto
                                                LinkState Inactive
                                                SyncState SyncLost
                                                LoginStatus NotLoggedIn
                                                Loopback Status Not Running
                                                MaxCredit 12
                                                DonatedToPort None
                                                RunningType Unknown
                                                PendingType gl-port
                                                InBandMgmt enabled
                                                SFPType NotInstalled
                                                SFPVendor Unknown
                                                SFPVendorID 0
                                                SFPPartNumber Unknown
                                                SFPRev 0
fc7             down                            type Fibre Channel
                                                OperState disabled
                                                PortID 010700
                                                WWN 200700c0bd00ac30
                                                LinkSpeed 2Gb/s
                                                LinkState Inactive
                                                SyncState SyncLost
                                                LoginStatus NotLoggedIn
                                                Loopback Status Not Running
                                                MaxCredit 12
                                                DonatedToPort None
                                                RunningType Unknown
                                                PendingType gl-port
                                                InBandMgmt enabled
```

```
                                                                SFPType NotInstalled
                                                                SFPVendor Unknown
                                                                SFPVendorID 0
                                                                SFPPartNumber Unknown
                                                                SFPRev 0
fc8          down                                               type Fibre Channel
                                                                OperState disabled
                                                                PortID 010800
                                                                WWN 200800c0dd00bc30
                                                                LinkSpeed auto
                                                                LinkState Inactive
                                                                SyncState SyncLost
                                                                LoginStatus NotLoggedIn
                                                                Loopback Status Not Running
                                                                MaxCredit 12
                                                                DonatedToPort None
                                                                RunningType Unknown
                                                                PendingType gl-port
                                                                InBandMgmt enabled
                                                                SFPType NotInstalled
                                                                SFPVendor Unknown
                                                                SFPVendorID 0
                                                                SFPPartNumber Unknown
                                                                SFPRev 0
fc15         up                                                 type Fibre Channel
                                                                OperState enabled
                                                                PortID 020f00
                                                                WWN 200f00065338bc21
                                                                LinkSpeed 2Gb/s
                                                                LinkState Active
                                                                SyncState SyncAcquired
                                                                LoginStatus LoggedIn
                                                                Loopback Status Not Running
                                                                MaxCredit 12
                                                                DonatedToPort None
                                                                RunningType f-port
                                                                PendingType f-port
                                                                InBandMgmt enabled
                                                                SFPType NotApplicable
                                                                SFPVendor N/A
                                                                SFPVendorID N/A
                                                                SFPPartNumber N/A
                                                                SFPRev N/A
fci1         up                                                 type Fibre Channel
                                                                loop LOOP READY
                                                                connection F Port
                                                                port id 0x20000
                                                                datarate 2 Gb/s
                                                                ALPA 0
                                                                firmware READY
fci2         up                                                 type Fibre Channel
                                                                loop LOOP READY
                                                                connection F Port
                                                                port id 0x20f00
                                                                datarate 2 Gb/s
                                                                ALPA 0
                                                                firmware READY
ge1          up   10.1.10.45/ffffff00      02023da80a51 type Gigabit Ethernet
                                                                mtu 1500
                                                                speed 1000000000
                                                                flags UP BRDCST RUNNING MLTCST
                                                                signal signal detect
                                                                duplex full
                                                                auto-negotiate complete
```

```
                                                        flow control rx pause
                                                        SFPVendor IBM
                                                        SFPVendorID 53P1476006FSR
                                                        SFPPartNumber IBM42P21SNY
                                                        SFPRev AA102P21SNY
ge2         up   10.3.10.25/ffffff00      02045aa80a51 type Gigabit Ethernet
                                                        mtu 1500
                                                        speed 1000000000
                                                        flags UP BRDCST RUNNING MLTCST
                                                        signal signal detect
                                                        duplex full
                                                        auto-negotiate complete
                                                        flow control rx pause
                                                        SFPVendor IBM
                                                        SFPVendorID 53P1476000XY1
                                                        SFPPartNumber IBM42P21SNY
                                                        SFPRev AA102P21SNY
Configuration Data


Interface IP/Netmask               Autonegotiation  Speed Duplex
--------- ------------------------ ---------------- ----- ------
mgmt      10.1.10.244/ffffff00     enabled          100   full
ha        10.1.20.56/ffffff00      enabled          100   full


                  Al-      Ext-   Fan-    Link  Loopback Mfs-    Time RSCN-   Port-  Port-
Interface Status  fairness credit enable  speed type     bundle  out  enable  type   mode
--------- -------- -------- ------ -------- ----- -------- -------- ---- ------- -----
fc1       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled fl-port
fc2       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port
fc3       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port
fc4       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port
fc5       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port
fc6       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port
fc7       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port
fc8       enabled disabled 0      enabled auto  Unknown  enabled 10   enabled gl-port

Interface MTU Size   AutoNegotiation  Vlan     IP/Netmask           Secondary
--------- ---------- ---------------- -------- -------------------- --------------------
ge1       1500       autodetect       enabled  10.1.10.45/ffffff00
ge2       1500       autodetect       enabled
```

Table 12-32 describes the fields shown in the display.

Table 12-32 Description of Fields in the "show interface" Command Output

Field	Description
Operational Data	Operational characteristics.
Interface	The interface name.
Stat	The status of the interface.
IP/Netmask	The IP address and subnet mask of the interface.
MAC	The MAC address of the interface.
Options	Configuration and operational information for the interface, including interface type, MTU size, speed, Small Form-factor Pluggable (SFP) module, running and pending port type, and activity information.
Configuration Data	Configuration information. Not all fields are applicable to all interfaces.

Table 12-32 Description of Fields in the "show interface" Command Output (continued)

Field	Description
Interface	The interface name.
IP/Netmask	The IP address and subnet mask of the interface.
AutoNegotiation	For management, HA and Gigabit Ethernet interfaces, the status of autonegotiation (enabled or disabled).
Speed	The port speed.
Duplex	The duplex setting.
Status	For FC interfaces, the status of the interface (enabled or disabled).
Al-fairness	For FC interfaces, the status of the fairness algorithm (enabled or disabled).
Ext-credit	For FC interfaces, the number of extended buffer-to-buffer credits available.
Fan-enable	For FC interfaces, the status of Fabric Address Notification (enabled or disabled).
Link speed	For FC interfaces, the operational transfer rate.
Loopback type	For FC interfaces, the type of loopback test enabled for the interface.
Mfs-bundle	For FC interfaces, the status of Multi-Frame Sequence bundling (enabled or disabled).
Timeout	For FC interfaces, the MFS-bundle timeout value.
RSCN-enable	For FC interfaces, the status of the generation of Registered State Control Notification (RSCN) messages (enabled or disabled).
Port-type	For FC interfaces, the pending port type.
Port-mode	For FC interfaces, the port mode (associated with translated loop port types).
MTU Size	For Gigabit Ethernet interfaces, the size of the maximum transfer unit, in bytes.
Vlan	For Gigabit Ethernet interfaces, the status of VLAN support (enabled or disabled).
Secondary	For Gigabit Ethernet interfaces, the interface assigned as the secondary for the specified IP address.

The following is example output from the **show interface brief** command, using the match expression *type* to limit the options displayed:

```
[SN5428-2A]# show interface brief type
Interface Stat IP/Netmask               MAC          Options
--------- ---- ----------------------- ------------ -------
lo0       up   127.0.0.1/ff000000      000000000000 type Loopback
mgmt      up   10.1.10.244/ffffff00    00012d071160 type Ethernet
ha        down                                      type type Unknown
fei2      up   2.0.0.1/ffffff00        00048aa58711 type Ethernet
fc0       up                                        type Fibre Channel
fc1       up                                        type Fibre Channel
fc2       down                                      type Fibre Channel
fc3       down                                      type Fibre Channel
fc4       down                                      type Fibre Channel
fc5       down                                      type Fibre Channel
fc6       down                                      type Fibre Channel
fc7       down                                      type Fibre Channel
fc8       down                                      type Fibre Channel
fc15      up                                        type Fibre Channel
```

```
fci1      up                                          type Fibre Channel
fci2      up                                          type Fibre Channel
ge1       up   10.1.10.45/ffffff00      02012d020304 type Gigabit Ethernet
ge2       up   10.3.10.23/ffffff00      02034d030405 type Gigabit Ethernet
```

The following is example output from the **show interface stats** command, for the FC interface *fc4*:

```
[SN5428-2A]# show interface fc4 stats

Port Attribute            Value      Port Attribute            Value
------------------------- ---------- ------------------------- ----------
BytePerf                  0          FramePerf                 0
TxBytePerf                0          TxFramePerf               0
RxBytePerf                0          RxFramePerf               0
ErrorRates                16

Login Count               0x6        Logout Count              0x5
Total Errors              0xb        Invalid Dest Addr         0x0

Class2 Frames In          0x0        Class2 Frames Out         0x0
Class3 Frames In          0x93       Class3 Frames Out         0x68
Total Rx Frames           0x93       Total Tx Frames           0x68

Class2 Words In           0x0        Class2 Words Out          0x0
Class3 Words In           0x0        Class3 Words Out          0x87
Total Rx Words            0x0        Total Tx Words            0x87

Decode Error Count        0xb        Loss of Sync Count        0x1
Invalid CRC Count         0x0        Tx Wait Count             0x34
Class3 Toss Count         0x0        FReject Count             0x0
FBusy Count               0x0        Link Failures             0x0
Flow Error Count          0x0        LP_TOV Timeout Count      0x0
Primitive Seq Errors      0x0

Rx Link Resets            0x0        Rx Offline Seq            0x0
Tx Link Resets            0x0        Tx Offline Seq            0xc
Total Link Resets         0x0        Total Offline Seq         0xc

AL Init Count             0x9        AL Init Error Count       0x1
LIP_F7_F7_Count           0x8        LIP_F7_AL_PS Count        0x1
LIP_F8_F7_Count           0x0        LIP_F8_AL_PS Count        0x0
Total LIPS Received       0x9        LIP_AL_PD_AL_PS Count     0x0
```

Table 12-33 describes the port attributes shown in the display:

Table 12-33 Description of Port Attributes in the "show interface stats" Command Output

Port Attribute	Description
BytePerf	Total number of bytes processed by this port.
TxBytePerf	Total number of bytes transmitted by this port.
RxBytePerf	Total number of bytes received by this port.
ErrorRates	The error rate for this port.
FramePerf	Total number of frames processed by this port.
TxFramePerf	Total number of frames transmitted by this port.
RxFramePerf	Total number of frames received by this port.
Login Count	Incremented when a user logs in.
Total Errors	Total number of errors detected.

Table 12-33 Description of Port Attributes in the "show interface stats" Command Output (continued)

Port Attribute	Description
Logout Count	Incremented when a user logs out.
Invalid Dest Add	Number of invalid destination addresses received.
Class2 Frames In	Number of class 2 frames received by this port.
Class3 Frames In	Number of class 3 frames received by this port.
Total Rx Frames	Total number of frames received by this port.
Class2 Frames Out	Number of class 2 frames sent by this port.
Class3 Frames Out	Number of class 3 frames sent by this port.
Total Tx Frames	Total number of frames issued by this port.
Class2 Words In	Number of class 2 words received by this port.
Class3 Words In	Number of class 3 words received by this port.
Total Rx Words	Total number of words received by this port.
Class2 Words Out	Number of class 2 words sent by this port.
Class3 Words Out	Number of class 3 words sent by this port.
Total Tx Words	Total number of words issued by this port.
Decode Error Count	Number of decoding errors detected.
Invalid CRC Count	Number of invalid CRCs detected.
Class3 Toss Count	Number of class 3 frames tossed.
FBusy Count	The number of times the switch sent a P_BSY because a Class 2 frame could not be delivered within a specified time period; the number of class 2 and class 3 fabric busy (F_BSY) frames generated by this port in response to incoming frames. This usually indicates a busy condition on the fabric that is preventing delivery of this frame.
Flow Error Count	Number of flow errors.
Primitive Seq Errors	Primitive sequence errors detected.
Loss of Sync Count	Number of synchronization losses detected by this port. A loss of synchronization (greater than 100 ms) is detected by the receipt of an invalid transmission word.
Tx Wait Count	Time waiting to transmit when blocked with no credit. Measured in FC Word times.
FReject Count	Number of frames from devices that were rejected.
Link Failures	Number of optical link failures detected by this port. A link failure is a loss of synchronization for a period of time greater than the timeout value or by loss of signal while not in the offline state. A loss of signal causes the switch to attempt to re-establish the link. If the link is not re-established by the time specified, a link failure is counted. A link reset is performed after a link failure.
LP_TOV Timeout Count	Number of times the timeout value on the local port has been triggered.
Rx Link Resets	Number of link reset primitives received from an attached device.
Tx Link Resets	Number of link resets issued by this port.

Table 12-33 Description of Port Attributes in the "show interface stats" Command Output (continued)

Port Attribute	Description
Total Link Reset	Total number of link reset primitives.
Rx Offline Seq	Number of offline sequences received. An OLS is issued for link initialization, an NOS state, or to enter the offline state.
Tx Offline Seq	Number of offline sequences issued by this port.
Total Offline Seq	Total number of offline sequences issues by this port.
AL Init Count	Incremented each time the port begins AL initialization.
LIP_F7_F7_Count	A loop initialization primitive frame used to acquire a valid AL_PA.
LIP_F8_F7_Count	A loop initialization primitive frame used to indicate that a loop failure has been detected at the receiver.
Total LIPS Received	Total number of loop initialization primitives received.
AL Init Error Count	Number of times the port entered initialization and the initialization failed.
LIP_F7_AL_PS Count	This LIP is used to reinitialize the loop. An L_port, identified by AL_PS, may have noticed a performance degradation and is trying to restore the loop.
LIP_F8_AL_PS Count	This LIP denotes a loop failure detected by the L_port identified by AL_PS.
LIP_AL_PD_AL_PS Count	Number of F7, AL_PS LIPs, or AL_PD (vendor specific) resets performed.

Related Commands

Command	Description
interface ge?	Configure various operational parameters associated with the Gigabit Ethernet interface.
interface ha ip-address	Specify the HA interface IP address and subnet mask.
interface mgmt ip-address	Specify the management interface IP address and subnet mask.
setup mgmt	Run the wizard to configure the management interface.
setup cluster	Change the configuration of the high availability environment.

show ip

To display information about the SN 5428-2 Storage Router network, including a variety of protocol stack statistics, use the **show ip** command.

show ip {arp | hosts | rip | tcp | udp}

show ip [icmp | route] stats

show ip route [all]

show ip [interface {*if-name* | all}] [tcp | udp] stats

Syntax Description

arp	Display the ARP table.
hosts	Display all known hosts on the IP network.
rip	Display Routing Information Protocol (RIP) information.
route	Display the system route table.
tcp	Display active TCP connections.
udp	Display system UDP activity.
icmp stats	Display ICMP-related network statistics.
route stats	Display route-related network statistics.
route all	Display the entire system route table, including non-operational route entries.
interface *if-name*	Display information for the specified interface only.
interface all	Display information for all interfaces.
tcp stats	Display TCP-related network statistics.
udp stats	Display UDP-related network statistics.
stats	Display all IP-related network statistics.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

- Use the **show ip** command with the **stats** keyword to display operational network statistics related to the specified protocol. The information displayed depends on the type of protocol specified.
- Use the **arp** keyword to display the ARP table.
- Use the **hosts** keyword to display all known IP hosts on the IP network.

- Use the **rip** keyword to display RIP timers and flags.
- Use the **route** keyword to display the routing table. Use the **all** keyword to display all routes, including non-operational routes. *0.0.0.0/32* is the default route.
- Use the **tcp** keyword to display active TCP connections, including the SN 5428-2 web server and other server tasks.
- Use the **udp** keyword to display User Datagram Protocol (UDP) activity on the system.

Examples

The following is example output from the **show ip stats** command:

```
[SN5428-2A]# show ip stats
IP Statistics:
         Packets Received     123477
 Packets Delivered to ULP     121436
             Bad Checksum          0
          Packet too Short         0
           Not Enough Data         0
        Bad Header Length          0
        Bad Packet Length          0
       Fragments Received          0
        Fragments Dropped          0
      Fragments Timed Out          0
      Packets Reassembled          0
        Packets Forwarded          0
 Destination Unreachables       2035
       Redirected Packets          0
         Unknown Protocol          6
             Packets Sent      12431
           Fragments Sent          0
           Out of Buffers          0
                 No Route          0
             Generic Drop          0
```

The following is example output from the **show ip rip** command. RIP has been enabled and is running on the storage router:

```
[SN5428-2A]# show ip rip
Routing Information Protocol (RIP) Information:
        Invalid Timer: 180
        Enabled Flag:  true
        Debug Flag:    false
        Running Flag:  true
```

The following is example output from the **show ip route** command. For static and RIP routes, the two numbers in brackets indicate the administrative distance and hop count values for the route. For example, the RIP route *10.1.10.0/24* has an administrative distance of 120 and a hop count of 1.

```
[SN5428-2A]# show ip route
Codes: C - connected, S - static, R - RIP
S    0.0.0.0/0 [1/0] via 10.2.0.94, mgmt
R    10.1.10.0/24 [120/1] via 10.1.50.10, ge4
C    10.1.50.0/24 is directly connected, ge4
C    10.1.60.0/24 is directly connected, ge1VLAN160
S    10.1.70.0/24 [1/0] via 10.1.50.12, ge4
S    10.1.70.0/24 [1/0] via 10.1.60.12, ge1VLAN160
C    10.1.90.0/24 is directly connected, ge3
C    10.2.0.0/24 is directly connected, mgmt
C    127.0.0.0/8 is directly connected, lo0
```

Related Commands

Command	Description
ip rip enable	Enable the storage router to learn dynamic routing using the routing information protocol (RIP).
ip rip timers	Configure various RIP timers.
ip route	Add a static route to the SN 5428-2 Storage Router routing table.

show logging

To display the logging table routing rules or to display contents of the log file, use the **show logging** command.

show logging [[all | last *nn*] **[match** *expression*] **| size]**

Syntax Descriptions

all	(Optional) Display all log file entries.
last *nn*	(Optional) Display the last *nn* lines from the current log file.
match *expression*	(Optional) Display all entries that match the specified string or regular expression. String matching is case-sensitive. By default, the last 20 log entries are searched.
size	(Optional) Display the number of messages in the log file and the size of the log file, in bytes.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

- Use the **show logging** command to display the routing rules in the logging table, which is used to route event messages to the appropriate destinations based on the message level and facility.
- Use the **match** *expression* parameters to display messages in the log file that match the specified string or regular expression. You can search the entire log file for matching messages or restrict the search to the last *nn* number of messages. If the **match** keyword is used without the **all** or **last** keywords, the search is made against the last 20 entries in the log file.

Examples

The following is example output from the **show logging** command:

```
[SN5428-2A]# show logging
Logging is enabled

Index Level     Priority Facility   Route
1     notice    5        all        all
2     info      6        all        logfile
3     debug     7        HA         rslog

Syslog host is enabled, ip-address is 10.1.1.144
```

The following example matches on a regular expression and displays all messages from the UI or IF facility, or all messages at notice or debug level. Only the last 50 log messages are searched for matches.

```
[sn5428-2a]# show logging last 50 match "(%(UI|IF)-|-[67]-)"
Oct 10 13:28:45: %UI-5-EWSSSL: Starting SSL OpenSSL 0.9.6e 30 Jul 2002 Port 443
Oct 10 13:28:53: %HA-6-HHMTMEC: HA_monitor_task: monitor event change with scsirouter/foo
Oct 10 13:29:09: %UI-5-NSCL: Successful CLI login from [console]
Oct 10 13:29:09: %UI-6-CCEMCS: Executed command "enable" return code is 0
Oct 10 13:29:14: %UI-6-CCEMCS: Executed command "show logging" return code is 0
```

The following is example output from the **show logging match "Successful"** command. Only the last 20 log entries are searched for matches.

```
[SN5428-2A]# show logging match "Successful"
Apr 10 20:48:13: %UI-5-NSCL: Successful CLI login from [10.1.68.196]
Apr 10 22:15:12: %UI-5-NSCL: Successful CLI login from [10.1.42.120]
May 29 21:43:05: %UI-5-NSCL: Successful CLI login from [console]
```

Related Commands

Command	Description
clear logging table	Clear the SN 5428-2 Storage Router logging table of all entries, or to reset the table to factory defaults.
delete logging	Delete a rule from the logging table.
logging #?	Insert a routing rule entry into the logging table.
logging level	Add rule entries to route storage router event, debug and trace messages to various destinations based on facility and notification level.
logging on	Enable or temporarily disable logging of storage router event message.
logging syslog	Identify a remote syslog host to be used to log messages.

show memory

To display information about memory and related resources, use the **show memory** command.

show memory

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display information about the storage router memory usage. The **show memory** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example output from the **show memory** command:

```
[SN5428-2A]# show memory

             Memory:  241445888             Available:   46363968
        Free Blocks:        569   Max Free Block Size:   39957504

Buffer Memory:

Buffer         Total    Free   Total    Free
Pool          Blocks  Blocks   Mbufs   Mbufs  Warnings
System          6925    6802   16384   16256
Data            8997    8997   16800   16800
GbE            65536   63494   65696   65696
iSCSI           3000    3000    3240    3240
```

Related Commands

Command	Description
show buffers	Display information about buffer pools.
show modules	Display addressing information related to the software modules.
show stack	Display the memory stack on a per-task basis.
show task	Display information about the tasks running in the storage router.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show modules

To display addressing information about the modules included in the SN 5428-2 Storage Router, use the **show modules** command.

show modules

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display the memory locations for each module of the storage router software. The **show modules** command is designed for debug purposes, and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example output from the **show modules** command:

```
[SN5428-2A]# show modules
Modules


MODULE NAME     MODULE ID  GROUP #    TEXT START DATA START  BSS START
--------------- ---------- ---------- ---------- ---------- ----------
    sysInit.out  0xd8fee20          2  0xd84cd40  0xd88beb0  0xd88cf50
  crashDump.out  0xd744a50          3  0xd73efc0  0xd743560  0xd7435f0
snmp_trapfuncs.out  0xd744690       4  0xd743d20  0xd743de0  0xd743e18
nuEventsCommon.out  0xd73bac8       5  0xd739590  0xd73b150  0xd73b198
   nuEvents.out  0xd738cf8          6  0xd730cf0  0xd736dd0  0xd7377c8
         ha.out  0xd72eab0          7  0xd6f0de0  0xd702130  0xd702460
   confNode.out  0xd729ee0          8  0xd720d70  0xd728730  0xd7287e0
 authServer.out  0xd729cb0          9  0xd70d960  0xd71e350  0xd71e570
       drv.out  0xd6d0bb0         10  0xd6a1dc0  0xd6b13c0  0xd6b14bc
     geBase.out  0xd6cb200         11  0xd6c69a0  0xd6ca350  0xd6ca3a8
     i8254x.out  0xd6cafd0         12  0xd663e30  0xd67bba0  0xd67be30
 qlogicBase.out  0xd6a1b88         13  0xd69f410  0xd6a1010  0xd6a10b8
     qlogic.out  0xd6a1958         14  0xd45caf0  0xd4b7890  0xd54b7c8
  qlogicCpp.out  0xd663bf8         15  0xd65b620  0xd662430  0xd6624f0
   qlptBase.out  0xd658068         16  0xd656c40  0xd6578f0  0xd657928
    qlptCpp.out  0xd656528         17  0xd653bf0  0xd6557d0  0xd655830
    qlptDpp.out  0xd652a40         18  0xd5e3680  0xd5fa500  0xd60d600
      encap.out  0xd64d110         19  0xd6496b0  0xd64bfe0  0xd64c060
     smlApi.out  0xd647fa8         20  0xd639b00  0xd646240  0xd6464b0
        vtp.out  0xd639298         21  0xd631f10  0xd637c90  0xd637dd0
```

```
     sysDpp.out  0xd62f8d8         22  0xd62ab00  0xd62e2e0  0xd62e3ac
scsiTargetFE.out  0xd62f660        23  0xd569a50  0xd592c90  0xd59aa38
scsiTcpAuth.out  0xd5e3448         24  0xd5dde00  0xd5e2340  0xd5e23c0
   slpcommon.out  0xd5dc2f8        25  0xd5d5e50  0xd5db310  0xd5db3d8
     libslp.out  0xd5d46e0         26  0xd5ce270  0xd5d3750  0xd5d3798
    slpattr.out  0xd5cced0         27  0xd5c6da0  0xd5cc3d0  0xd5cc408
       slpd.out  0xd5c5e20         28  0xd6137e0  0xd623d60  0xd6241d8
    slptool.out  0xd5c0db0         29  0xd5bef10  0xd5c0610  0xd5c0648
scsiTcpServer.out  0xd5c0b68       30  0xd3bc7d0  0xd3fa560  0xd3fa97c
       ttcp.out  0xd45c8b8         31  0xd42cf60  0xd434110  0xd434838
   confMgmt.out  0xd459830         32  0xd4564f0  0xd458980  0xd458b10
     hdwmon.out  0xd4595a8         33  0xd44d3b0  0xd453c40  0xd45457c
    diagMon.out  0xd42cd28         34  0xd5a20b0  0xd5b46d0  0xd5b52cc
diagCppUtils.out  0xd42cae0        35  0xd449610  0xd44d110  0xd44d3a8
diagCppTests.out  0xd426db8        36  0xd421c10  0xd4264e0  0xd426538
diagDppTests.out  0xd421360        37  0xd55a230  0xd569680  0xd569838
sn5428TestTable.out  0xd4210a8     38  0xd42c230  0xd42c6f0  0xd42ca5c
    confXML.out  0xd420e70         39  0xd403560  0xd41e8f0  0xd41e9c8
    confObj.out  0xd420c40         40  0xcf55a50  0xcfafd70  0xcfb04b4
    openssl.out  0xd044590         41  0xcce9a10  0xcdd21d0  0xcddc158
     sshmgr.out  0xcf55818         42  0xcf523f0  0xcf546c0  0xcf546e0
 clusterApp.out  0xcf515f8         43  0xcf46330  0xcf4f7b0  0xcf4f81c
        cdp.out  0xcf428e8         44  0xcf36130  0xcf40380  0xcf40958
     slpApp.out  0xcf426a0         45  0xcf41240  0xcf41ec0  0xcf41efc
  systemApp.out  0xcf33bc8         46  0xce7a5a0v0xceb5630  0xceb5b34
   ipRouter.out  0xcf24eb0         47  0xcf1d0a0  0xcf23270  0xcf2330c
      srMon.out  0xcf193e8         48  0xcf10a20  0xcf17b50  0xcf17c00
 scsiRouter.out  0xcf19030         49  0xcedd6a0  0xcf07530  0xcf07854
 frameRacer.out  0xcf18ba0         50  0xcec70a0  0xced0c10  0xced0cdc
authServerApp.out  0xcf0c8f0       51  0xcebec10  0xcec7010  0xcec708c
    fcSwApp.out  0xcf0c008         52  0xce14c70  0xce32170  0xce337dc
      fdisk.out  0xce67f80         53  0xce61a80  0xce66c90  0xce670bc
     sysMon.out  0xce5fae8         54  0xce5d6a0  0xce5f000  0xce5f0a4
         ui.out  0xce5f688         55  0xc618c20  0xc881aa0  0xc8bcff4
  snmp_util.out  0xcce97d8         56  0xcce82a0  0xcce8f10  0xcce8f68
       mib2.out  0xcce7848         57  0xccb7070  0xccc0d60  0xccc3078
        ifx.out  0xcce1cc0         58  0xccdd210v0xcce04b0  0xcce0bc8
      ether.out  0xccdbfe8         59  0xccda4d0  0xccdb370  0xccdb6f8
     mau_if.out  0xccd9bf0         60  0xccd76a0  0xccd8bd0  0xccd8fe8
    mau_neg.out  0xccd6930         61  0xccd50c0  0xccd5d80  0xccd6058
     entity.out  0xccd6680         62  0xcccee90  0xccd0ff0  0xccd4988
entity_sensor.out  0xcccec50       63  0xcccbe20  0xcccd250v0xcccdeb8
 entity_ext.out  0xcccea08         64  0xccc9c70  0xcccab10  0xcccacf8
 entity_fru.out  0xccb6e38         65  0xccb46f0  0xccb5bb0  0xccb6008
   cdp_snmp.out  0xccb3420         66  0xccafb40  0xccb1ec0  0xccb2378
   scsi_mib.out  0xccaec78         67  0xcc8a440  0xcc92270  0xcc93aa8
fcmgmt_fcsw.out  0xcca86c0         68  0xcc9b660  0xcca32a0  0xcca5d98
 syslog_mib.out  0xcc8a208         69  0xcc854c0  0xcc88800  0xcc88d10
config_copy.out  0xcc83b18         70  0xcc7da20  0xcc820d0  0xcc82600
   srMonApp.out  0xcc83898         71  0xcc7ce50  0xcc7d9d0v0xcc7da0c
    snmpApp.out  0xcc83638         72  0xcc88f40v0xcc8a040  0xcc8a15c
```

Related Commands

Command	Description
show buffers	Display information about buffer pools.
show memory	Display information about memory and related resources.
show stack	Display the memory stack on a per-task basis.
show task	Display information about the tasks running in the storage router.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show restrict

To display current restrictions on the use of the SN 5428-2 Storage Router console, interfaces, and ports, use the **show restrict** command.

show restrict

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to identify the current interface access restrictions.

Examples

The following is example output from the **show restrict** command. The output shows that passwords are not enabled for the console. All interfaces are closed to FTP and SSL. The HA and Gigabit Ethernet interfaces are also closed to SSH and Telnet. The Gigabit Ethernet interfaces are closed to HTTP. All interfaces are open to SNMP.

```
[SN5428-2A]# show restrict

Interface  Port    Status  Protocol
---------  ------  ------  --------
mgmt       21      closed  ftp
           22      open    ssh
           23      open    telnet
           80      open    http
           161     open    snmp
           443     closed  ssl

ha         21      closed  ftp
           22      closed  ssh
           23      closed  telnet
           80      open    http
           161     open    snmp
           443     closed  ssl

ge1        21      closed  ftp
           22      closed  ssh
           23      closed  telnet
           80      closed  http
           161     open    snmp
           443     closed  ssl
```

```
ge2         21      closed  tp
            22      closed  ssh
            23      closed  telnet
            80      closed  http
            161     open    snmp
            443     closed  ssl

   Console Passwords: disabled
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
restrict console	Enable or disable password checking on the console interface.

show route

To display all static routes that have been configured, including those that have not been added to the routing table because the associated interface is not yet configured, use the **show route** command.

show route

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display all static routes that have been configured for the storage router, including routes that have been configured but have not been added to the routing table. Use the **show ip route** command to display the entire routing table.

Note A route will not become operational until the associated interface is configured.

Examples

The following is example output from the **show route** command. The administrative distance displays after the route information. In this example, there are two static routes. One static route is configured as a default route, and both static routes have the default administrative distance of 1.

```
[SN5428-2A]# show route
ip route default 10.1.10.201 1
ip route 172.16.211.0/24 10.1.10.201 1
```

Related Commands

Command	Description
ip default-gateway	Configure a gateway for the default route.
ip route	Add a static route to the SN 5428-2 Storage Router routing table.
show ip	Display entries from the SN 5428-2 Storage Router routing table and statistics about the protocols used in the storage router network.

show runningconfig

To display the current running configuration of the SN 5428-2 Storage Router, or save the commands used to create the running configuration to a file, use the **show runningconfig** command.

show runningconfig [to *filename***]**

Syntax Description

to *filename*	(Optional) Save the running configuration of the storage router as a series of CLI commands and descriptive text in the specified file. The file will be saved in the *script* directory.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show runningconfig** command to display the current system configuration information as it would be saved to a configuration file. Use the **to** keyword to save the running configuration as a series of CLI commands and descriptive text in the specified file. This file is saved in the *script* directory and can be used as a basis to create command scripts to automate common tasks. Use the **read script** command to execute a command script.

Note A saved configuration file requires editing before it can be used as a command script via the **read script** command.

Table 12-34 describes the significant elements that are displayed.

Table 12-34 Elements Displayed for the show runningconfig Command

Element	Description
AAA	Authentication, authorization, and accounting method configuration information.
ACCESSLIST	Access list description and entry information.
ADMIN	The storage router administrator contact information.
ADMIN LOGIN	The Administrator mode password.
CDP	Cisco Discovery Protocol configuration, including timer and holdtime settings.
CLUSTER	The name of the cluster to which this storage router belongs.
DNS	The name of any defined domain name servers.

Table 12-34 Elements Displayed for the show runningconfig Command (continued)

Element	Description
FCIP	FCIP instance configuration information.
FC PORTS	Operational characteristics of the Fibre Channel interfaces.
FC SWITCH	Global Fibre Channel attributes.
FC ZONE	Zone configuration information.
FC ZONE ALIAS	Zone alias configuration information.
FC ZONE SET	Zone set configuration information.
GE	IP addresses and operational characteristics of the Gigabit Ethernet interfaces.
HA	HA configuration information.
HA Port	IP address and operational characteristics of the HA interface.
LOGGING ROUTE FACILITY	The logging table.
Mgmt Port	IP address and operational characteristics of the management interface.
MONITOR LOGIN	The Monitor mode password.
RESTRICT	Storage router interface restrictions.
RIP	Routing Information Protocol (RIP) configuration information.
SCSIROUTER	Configuration information for each SCSI routing instance, including name, description, server interface and other instance-specific configuration information.
SNMP	The SNMP settings.
SNTP	Date and time information, including the address of any associated NTP server.
SOFTWARE	The default download location for storage router software.
SSH	Secure Shell (SSH) configuration information.
SYSLOG	Remote logging configuration information.
SYSTEM	SN 5428-2 Storage Router name.
TELNET	Session timeout information.
VLAN	VLAN configuration information.
VTP DOMAIN	VTP domain name.
VTP MODE	VTP configuration mode.

Examples

The following is an example of output from the **show runningconfig** command, for a storage router deployed for SCSI routing:

```
[SN5428-2A]# show runningconfig
!
! CLUSTER
!
! cluster Lab1
!
! ACCESSLIST
```

```
!
accesslist aegis
accesslist aegis 10.2.0.23/255.255.255.255
accesslist aegis 10.3.0.36/255.255.255.255
accesslist aegis 10.4.0.49/255.255.255.255
accesslist aegis iscsi-name ign.1987-05.com.cisco.08.80342789af73ebcdef123.xxx
accesslist aegis iscsi-name ign.1987-05.com.cisco.08.7125abc9af73ebcdef123.xxx
accesslist aegis iscsi-name ign.1987-05.com.cisco.08.1234abecf9876bac00034.xxx
accesslist aegis chap-username 12h7b.lab2.webservices
accesslist aegis chap-username dorothy
accesslist aegis chap-username lab2servp
!
! VTP DOMAIN
!
vtp domain none
!
! VTP MODE
!
vtp mode client
!
! VLAN
!
! (no vlan(s) found)
!
! SCSIROUTER
!
scsirouter zeus
scsirouter zeus authenticate "none"
scsirouter zeus primary "none"
scsirouter zeus reserve proxy disable
scsirouter zeus failover primary none
scsirouter zeus failover secondary none
scsirouter zeus lun reset no
scsirouter zeus serverIf ge1 10.1.0.45/255.255.255.0
scsirouter zeus target webserver2 wwpn "21:00:00:05:ae:03:6d:6e"
scsirouter zeus target webserver2 enabled
scsirouter zeus target webserver2 accesslist "aegis"
!
! SYSTEM
!
hostname SN5428-2A
!
! Mgmt Port
!
interface mgmt ip-address 10.1.10.244/255.255.255.0
!
! HA Port
!
interface ha ip-address 10.1.20.56/255.255.255.0
! GE
!
interface ge2 autonegotiation autodetect
interface ge2 mtusize 1500
interface ge2 vlan enable
!
! GE
!
interface ge1 autonegotiation autodetect
interface ge1 mtusize 1500
interface ge1 vlan enable
!
! ROUTES
!
ip route 10.1.30.0/255.255.255.0  10.1.10.201
```

```
ip route 10.1.40.243/255.255.255.255 10.1.10.201
ip route 10.1.50.249/255.255.255.255 10.1.10.201
ip default-gateway 10.1.10.201
!
! RIP
!
no ip rip enable
ip rip timers invalid 180

! ADMIN LOGIN
!
admin password <password>
!
! MONITOR LOGIN
!
monitor password <password>
!
! SNTP
!
clock timezone CST6CDT
ntp peer 10.1.60.86
!
! SNMP
!
snmp-server community public ro
snmp-server community private rw
no snmp-server host all traps
no snmp-server sendauthtraps
snmp-server linkupdown mgmt
snmp-server linkupdown ge1
snmp-server linkupdown ge2
snmp-server linkupdown fc1
snmp-server linkupdown fc2
snmp-server linkupdown fc3
snmp-server linkupdown fc4
snmp-server linkupdown fc5
snmp-server linkupdown fc6
snmp-server linkupdown fc7
snmp-server linkupdown fc8
!
! DNS
!
ip name-server 10.1.40.243 10.1.50.249
ip domain-name mystoragenet.com
!
! TELNET
!
no session-timeout
!
! SSH
!
ssh enable
!
! SOFTWARE
!
software http url "http://www.cisco.com"
software http username “ciscocustomer” password "<password>"
software proxy username none
!
! HA
!
! ha configuration clustered
!
!
```

```
! SYSLOG
!
logging syslog 10.4.5.6
!
! LOGGING ROUTE FACILITY
!
logging level info from all to console logfile
logging level debug from HA to logfile
!
! RESTRICT
!
restrict mgmt ftp
no restrict mgmt telnet
no restrict mgmt http
no restrict mgmt snmp
restrict mgmt rlogin
restrict mgmt ssl
no restrict mgmt ssh
!
restrict ha ftp
restrict ha telnet
no restrict ha http
no restrict ha snmp
restrict ha rlogin
restrict ha ssl
no restrict ha ssh
!
restrict ge1 ftp
restrict ge1 telnet
restrict ge1 http
restrict ge1 snmp
restrict ge1 rlogin
restrict ge1 ssl
no restrict ge1 ssh
!
restrict ge2 ftp
restrict ge2 telnet
restrict ge2 http
restrict ge2 snmp
restrict ge2 rlogin
restrict ge2 ssl
no restrict ge2 ssh
!
!
! CDP
!
cdp enable
cdp timer 60
cdp holdtime 180
cdp interface mgmt enable
cdp interface ha enable
cdp interface ge1 enable
cdp interface ge2 enable
!
! FC SWITCH
!
fcswitch ratov 10000
fcswitch edtov 2000
fcswitch dstov 5000
fcswitch fstov 1000
fcswitch zoning default all
fcswitch zoning autosave enable
fcswitch zoning merge SW2
fcswitch domainid 99 force
```

```
no fcswitch domainid lock enable
fcswitch interop-credit 12
!
! FC ZONE ALIAS
!
fcalias iscsi
fcalias iscsi member wwpn 280000059ac58710
fcalias iscsi member wwpn 290000059ac58710
fcalias foo
fcalias foo member wwpn 20:1b:00:38:15:74:b1:19
!
! FC ZONE
!
zone footest
zone footest member wwpn 201a0381474b118
zone footest member fcalias foo
!
! FC ZONE SET
!
zoneset thor
zoneset thor zone agamemnon
no zoneset thor enable
!
! FC PORT
!
interface fc1 enable
interface fc1 ms-enable enable
no interface fc1 al-fairness enable
interface fc1 fan-enable enable
interface fc1 ext-credit 0
interface fc1 mfs-bundle enable timeout 10
interface fc1 linkspeed auto
interface fc1 type gl-port
!
interface fc2 enable
interface fc2 ms-enable enable
no interface fc2 al-fairness enable
interface fc2 fan-enable enable
interface fc2 ext-credit 0
interface fc2 mfs-bundle enable timeout 10
interface fc2 linkspeed auto
interface fc2 type gl-port
!
interface fc3 enable
interface fc3 ms-enable enable
no interface fc3 al-fairness enable
interface fc3 fan-enable enable
interface fc3 ext-credit 0
interface fc3 mfs-bundle enable timeout 10
interface fc3 linkspeed auto
interface fc3 type gl-port
!
interface fc4 enable
interface fc4 ms-enable enable
no interface fc4 al-fairness enable
interface fc4 fan-enable enable
interface fc4 ext-credit 0
interface fc4 mfs-bundle enable timeout 10
interface fc4 linkspeed auto
interface fc4 type gl-port
!
interface fc5 enable
interface fc5 ms-enable enable
no interface fc5 al-fairness enable
```

```
interface fc5 fan-enable enable
interface fc5 ext-credit 0
interface fc5 mfs-bundle enable timeout 10
interface fc5 linkspeed auto
interface fc5 type gl-port
!
interface fc6 enable
interface fc6 ms-enable enable
no interface fc6 al-fairness enable
interface fc6 fan-enable enable
interface fc6 ext-credit 0
interface fc6 mfs-bundle enable timeout 10
interface fc6 linkspeed auto
interface fc6 type gl-port
!
interface fc7 enable
interface fc7 ms-enable enable
no interface fc7 al-fairness enable
interface fc7 fan-enable enable
interface fc7 ext-credit 0
interface fc7 mfs-bundle enable timeout 10
interface fc7 linkspeed auto
interface fc7 type gl-port
!
interface fc8 enable
interface fc8 ms-enable enable
no interface fc8 al-fairness enable
interface fc8 fan-enable enable
interface fc8 ext-credit 0
interface fc8 mfs-bundle enable timeout 10
interface fc8 linkspeed auto
interface fc8 type gl-port

! AAA
!
aaa new-model
aaa authentication iscsi temp local group radius local-case
username "fred" password "9 af4f2428498a41a31e237de1c4a9b9fcef"
username "pat" password "9 7ddbccc3d0daf013f4293c3d3bd94539dd"
username "kris" password "9 0607167520058771e66ab1d379d7e6505f"
username "adrian" password "9 0ad24a3b35dc296d894e512416d572b3ee"
radius-server retransmit 12
radius-server host 10.5.0.53 auth-port 1645
tacacs-server timeout 12
tacacs-server host 10.7.0.22 auth-port 49
```

The following example creates a command file called *SN5428-2A_script2* in the *script* directory. It contains many of the CLI commands that were issued to create the current running configuration.

```
[SN5428-2A]# show runningconfig to SN5428-2A_script2
```

Related Commands

Command	Description
read script	Read and execute the CLI commands in the named script file.
restore all	Restore the contents of the named configuration file into memory.
save all	Save all configuration information
show bootconfig	Display the bootable configuration, or create a command file based on the bootable configuration.
show savedconfig	List the contents of the savedconfig directory or the contents of the named configuration file.
show script	Display the contents of the script directory or the contents of the named command file.

show savedconfig

To list the available files in the *savedconfig* directory or to view the contents of a specific configuration file, use the **show savedconfig** command. Configuration files are stored in the *savedconfig* directory.

show savedconfig [*filename***]**

Syntax Description

filename	(Optional) The name of the configuration file to display. This file must exist in the *savedconfig* directory and be in the appropriate format.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display a list of configuration files in the *savedconfig* directory before attempting a restore. Use the *filename* parameter to view the contents of the specified configuration file. You can also use the **show scsirouter from** or **show accesslist from** commands to display specific objects from the named configuration file, allowing you to verify that the object of your **restore** command exists in the selected file.

Examples

The following is example output from the **show savedconfig** command:

```
[SN5428-2A]# show savedconfig
Config_Nov122001
Config_Jul172001
Special_Config
AccessList_Config
```

The following is example output from the **show savedconfig** command using the *filename* parameter:

```
[SN5428-2A]# show savedconfig AccessList_Config
!
! CLUSTER
!
cluster Lab1
!
! ACCESSLIST
!
accesslist aegis
accesslist aegis 10.2.0.23/255.255.255.255
accesslist aegis 10.3.0.36/255.255.255.255
accesslist aegis 10.4.0.49/255.255.255.255
```

Related Commands

Command	Description
copy	Copy the named configuration or script file from a remote location to the storage router or from the storage router to a remote location.
delete savedconfig	Remove a saved configuration file from the storage router.
restore aaa	Restore AAA authentication services from the named configuration file.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore all	Restore the contents of the named configuration file into memory.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
restore system	Restore selected system information from the named configuration file.
restore vlan	Restore VLAN configuration information from the named configuration file.
save aaa	Save the current AAA configuration information.
save accesslist	Save configuration data for the named access list or all access lists.
save all	Save all configuration information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
save vlan	Save configuration information for the named VLAN or all VLANs.
show bootconfig	Display the bootable configuration, or create a command file based on the bootable configuration.
show runningconfig	Display the running configuration, or create a command file based on the running configuration.

show script

To list the available files in the *script* directory or to view the contents of a specific command file, use the **show script** command. Configuration files are stored in the *script* directory.

show script [*filename***]**

Syntax Description

filename	(Optional) The name of the command file to display. This file must exist in the *script* directory.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display a list of files in the *script* directory before attempting to execute the commands in the script using the **read script** command. Use the *filename* parameter to view the contents of the specified command file.

Examples

The following is example output from the **show script** command:

```
[SN5428-2A]# show script
MyScriptFile
Lab1_Script
Test_12Nov
MyBoot
```

Related Commands

Command	Description
copy	Copy the named configuration or script file from a remote location to the storage router or from the storage router to a remote location.
read script	Read and execute the CLI commands in the named script file.

show scsirouter

To display configuration information and operational statistics related to the named SCSI routing instance or all instances, use the **show scsirouter** command.

show scsirouter

show scsirouter *name* **all**

show scsirouter {*name* **| all} [from {***filename* **| bootconfig | runningconfig}]**

show scsirouter {*name* **| all} brief**

show scsirouter {*name* **| all} connection [stats | tcp]**

show scsirouter {*name* **| all} failover**

show scsirouter all failover brief

show scsirouter {*name* **| all} host [stats | table]**

show scsirouter {*name* **| all} serverif [from {***filename* **| bootconfig | runningconfig}]**

show scsirouter {*name* **| all} stats**

show scsirouter {*name* **| all} target {***name* **| all} [from {***filename* **| bootconfig | runningconfig} | stats]**

show scsirouter {*name* **| all} target table**

Syntax Description

name	The name of the SCSI routing instance or the name of the target.
name **all**	Display all configuration information for the specified SCSI routing instance.
all	Display the requested information for all SCSI routing instances or all targets.
from *filename*	(Optional) The name of the saved configuration file containing the specified SCSI routing instance information. This file must exist in the *savedconfig* directory.
from bootconfig	(Optional) Display the requested configuration information from the persistent saved configuration. Use this keyword string to display complete configuration information for a SCSI routing instance from any node in a cluster, even if the instance is not active on that node.
from runningconfig	(Optional) Display the requested configuration information from the currently running configuration.
brief	(Optional) Display status and brief configuration information.
connection	(Optional) Display connection information for the named SCSI routing instance.
failover	(Optional) Display the HA failover information for the named SCSI routing instance.

host	(Optional) Display status and other operational data for IP hosts currently connected to the named SCSI routing instance.
host table	(Optional) Display information about all IP hosts that have attempted to connect to the named SCSI routing instance.
serverif	(Optional) Display configuration information for the Gigabit Ethernet interface associated with the named SCSI routing instance.
stats	(Optional) Display accumulated operational information for the SCSI routing instance. This display shows statistics accumulated since the named SCSI routing instance became active or statistics were last cleared, whichever is more recent.
target	(Optional) Display configuration information related to targets (including the iSCSI Name) associated with the named SCSI routing instance.
target table	Display all targets, target status, and access list associations for the specified SCSI routing instance or all instances, in table format.
tcp	(Optional) Display current and maximum TCP window size for each connected IP host.

Defaults

The **show scsirouter** command with no parameters displays the name of each SCSI routing instance running on this storage router. Unless a specific **from** parameter is specified, any information displayed is from the currently running configuration.

Command Modes

Administrator or Monitor

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

In a cluster environment, a SCSI routing instance can only be active on one storage router at a time. Issue the appropriate **show** commands from the node that is running the instance to display complete configuration information and operational statistics. If you issue **show** commands from a storage router that is not running the instance, operational statistics are not available and configuration information is truncated.

Timesaver

To display complete configuration information for a SCSI routing instance from any storage router in a cluster, even if that SCSI routing instance is not active on that node, use the command **show scsirouter** *name* **from bootconfig**.

Use the optional **target** or **serverif** keyword to restrict the display to configuration information related to the specified element. For example:

- The command **show scsirouter** *name* **target** displays current configuration information, including access list and iSCSI Name, for all targets associated with the named SCSI routing instance.
- The command **show scsirouter all serverif** displays current configuration information for the Gigabit Ethernet interfaces associated with all SCSI routing instances.

Use the **connection** or **host** keyword to display specific operational data for the named SCSI routing instance.

- The command **show scsirouter** *name* **host stats** displays IP host status and operational statistics for currently connected IP hosts for the named SCSI routing instance.
- The command **show scsirouter** *name* **host table** displays iSCSI Name, alias, IP address and CHAP user name (if any) for all IP hosts that have attempted to access the named SCSI routing instance. If you are going to use iSCSI Name entries for access control, you can use this command to obtain or verify the iSCSI Name of your IP hosts.
- The command **show scsirouter** *name* **stats** displays accumulated operational information about all IP hosts that have been connected since the named instance became active. Operational statistics include logins, active connections, target access and authentication failure information.
- The command **show scsirouter all connection stats** displays connection statistics for all SCSI routing instances.
- The **show scsirouter all stats** command is useful for determining quick operational status of all instances running in the storage router.
- Use the **show scsirouter all** command to display configuration information for all SCSI routing instances, including descriptions, targets and associated access lists.

Examples

The following is example output from the **show scsirouter** command:

```
[SN5428-2A]# show scsirouter
foo
zeus
```

The following is example output from the **show scsirouter stats** command:

```
[SN5428-2A]# show scsirouter all stats

                          Logins   Logins Target Access  Authentication
Router     Started        Accepted Active Failures       Failures
---------- -------------- -------- ------ -------------- --------------
zeus       Jul 25 12:40:03 6        5      0              0
1 scsirouter listed
```

Table 12-35 describes the significant fields in the display.

Table 12-35 Description of Fields in the "show scsirouter stats" Command Output

Field	Description
Router	The name of the SCSI routing instance.
Started	The date and time the SCSI routing instance was last started.
Logins Accepted	The total number of logins accepted since the last time the SCSI routing instance was started or counters were cleared.
Logins Active	The total number of active connections.
Target Access Failures	The total number of times the SCSI routing instance failed to access a target since the last time the SCSI routing instance was started or counters were cleared.
Authentication Failures	If authentication is enabled, the total number of attempts to access storage that failed authentication checks.

The following is example output from the **show scsirouter all host table** command. If you are going to use iSCSI Name entries for access control, you can configure your IP hosts and attempt to access the desired SCSI routing instance. Then issue this command to display the iSCSI Name information, which can be used to populate the desired access list.

```
[SN5428-2A]# show scsirouter all host table
Name:   iqn.1987-05.com.cisco.01.27a2410eaed4affa82a81143d70ce10
Alias:  lab1
IP:     10.2.0.23
CHAP username:  742Nlab1
```

The following is example output from the **show scsirouter all failover** command. This command displays both configured and current operational failover information for all the SCSI routing instances in the cluster. Table 12-36 describes the significant fields in this display.

```
[SN4528-2A]# show scsirouter all failover

    Each [    ] below contains node operating characteristics for a scsirouter.
    [Instance Status, Failover Priority, Eligibility]
    Instance Status('M' = Master, ' ' = Slave)
    Failover Priority('  ' = none, 'fp' = primary, 'fs' = secondary)
    Eligibility(U = Eligibility has not been initialized
                N = None of the configured devices are available or
                    a configured interface is unavailable
                S = Some of the configured devices are available
                A = All of the configured devices are available
                P = Primary and all of the configured devices are available)

                      Configured Configured
           Configured Failover   Failover   This     Failover
Scsirouter Primary    Primary    Secondary  Node     Node List
---------- ---------- ---------- ---------- -------- ----------------
R1         none       none       none       [   A]   [MfpA] SN5428-2B
R2         SN5428-2A  none       none       [M  P]   [   A] SN5428-2B
R3         SN5428-2A  none       none       [M  P]   [   S] SN5428-2B
R4         SN5428-2A  none       none       [M  P]   [   N] SN5428-2B
```

Table 12-36 Description of Fields in the "show scsirouter all failover" Command Output

Field	Description
Scsirouter	The name of the SCSI routing instance in the cluster.
Configured Primary	The name of the storage router configured as the primary for the SCSI routing instance, if any.
Configured Failover Primary	If a failover list has been explicitly configured for the SCSI routing instance, the first storage router in the list.
Configured Failover Secondary	If a failover list has been explicitly configured for the SCSI routing instance, the second storage router in the list.
This Node	The instance status, failover priority and eligibility information for the storage router from which the command was issued.
Failover Node List	The instance status, failover priority and eligibility information for the indicated node, in the order that the nodes appear in the failover list.

The following is example output from the **show scsirouter all failover brief** command. This command shows the eligibility of each SCSI routing instance for each storage router in the cluster.

```
[SN5428-2A]# show scsirouter all failover brief
    Descriptions of eligibility ranked from most eligible to least:
       Primary = This node is configured as primary and
                 all of the configured devices are available
       All = All of the configured devices are available to this node
       Some = Some of the configured devices are available to this node
       None = None of the configured devices are available to this node
              or a configured interface is unavailable
       Unknown = Eligibility information has not been initialized

Scsirouter SN5428-2A  SN5428-2B
---------- ---------- ----------
R1         All        All
R2         Primary    All
R3         Primary    Some
R4         Primary    None
```

Related Commands

Command	Description
accesslist	Create an access list entity.
accesslist A.B.C.D/bits	Add IP addresses to an access list.
clear counters scsirouter	Reset accumulated operational statistics for the specified SCSI routing instance.
delete scsirouter	Delete the named SCSI routing instance or the specified element of the SCSI routing instance.
restore accesslist	Restore the named access list or all access lists from the named configuration file.
restore scsirouter	Restore the named SCSI routing instance from the named configuration file.
save accesslist	Save configuration data for the named access list or all access lists.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information.
scsirouter enable	Stop or start the named SCSI routing instance.
scsirouter failover	Add the storage router to the HA failover list for the specified SCSI routing instance.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
scsirouter target maxcmdqueuedepth	Specify the maximum number of commands allowed at any given time from each iSCSI session to the specified target.
setup scsi	Run the wizard to configure a SCSI routing instance.

show sessions

To display information about active Telnet, SSH or GUI sessions to the SN 5428-2 Storage Router, use the **show sessions** command.

show sessions {all | cli | gui}

Syntax Description

all	Display all active Telnet or GUI management sessions.
cli	Display only active CLI sessions.
gui	Display only active GUI sessions.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.
3.3.1	The maximum number of concurrent sessions was changed to 16.

Usage Guidelines

There are a maximum of 16 concurrent management sessions per storage router. The sessions are restricted as follows:

- One session is reserved for the EIA/TIA-232 console interface.
- There can be a maximum of seven CLI sessions via Telnet or SSH.
- There can be a maximum of eight GUI sessions via HTTP or HTTPS.

Examples

The following is example output from the **show sessions** command. The asterisk designates the CLI management session from which the command was issued.

```
[SN5428-2A]# show sessions all

   Id Auth    From             Login
----  -------  ---------------  ---------------
 * 1  monitor  console          Mar 22 17:19:10  [TELNET]
   2  admin    10.1.40.212      Mar 22 11:44:46  [TELNET]
   3  admin    10.3.12.222      Mar 22 11:47:12  [GUI]

3 of 16 sessions
```

Related Commands

Command	Description
admin password	Set the login password for administrative access to the storage router management interface.
monitor password	Set the login password for view-only access to the storage router management interface.
session-timeout	Set the number of minutes a management session to the storage router can be inactive before the session times out.

show slp

To display the status of the Service Location Protocol (SLP) service and the interface address where the SLP service is listening for incoming SLP service requests, use the **show slp** command.

show slp

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display the operational status of the SLP service. The SLP listens on all configured IP interfaces.

Examples

The following is example output from the **show slp** command:

```
[SN5428-4A]# show slp

SLP is RUNNING

Listening interfaces:
        127.0.0.1               TCP LISTEN
        10.1.40.116             TCP LISTEN    UDP MULTICAST    UDP UNICAST
        10.1.20.116             TCP LISTEN    UDP MULTICAST    UDP UNICAST
```

Related Commands

Command	Description
scsirouter slp enable	Enable the advertisement of the targets of the named SCSI routing instance with the SLP service.
slp findattrs	Discover the attributes of a specific SLP registered service.
slp findsrvs	Locate a SLP registered service of a specific type on the local subnet.
slp findsrvtypes	Discover all SLP registered service types on the local subnet.

show snmp

To display SNMP management configuration information for the SN 5428-2 Storage Router, use the **show snmp** command.

show snmp

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show snmp** command to review the SNMP configuration settings before changing those settings with the **snmp-server** command.

The command displays IP addresses of the destination hosts used for notifications (traps), the name of the SNMP community having read access to the storage router network (get-community), and the name of the community having write access to the storage router network (set-community), the version of traps to be sent, and configuration information for Send Authentication, Entity Field Replaceable Unit (FRU), and Link Up/Down traps.

Note The community names are only displayed when the command is issued from an Administrator mode session.

Examples

The following is example output from the **show snmp** command, issued from an Administrator mode session:

```
[SN5428-2A]# show snmp
First Trap Host: 10.1.30.17, will be sent version 1 traps
Second Trap Host: <none found or defined>
Get Community String: public
Set Community String: mynetmanagers
Send Authentication Traps: enabled
Send Entity FRU Traps: enabled
Link Up/Down Enable for mgmt: enabled
Link Up/Down Enable for ha: disabled
Link Up/Down Enable for fc1: enabled
Link Up/Down Enable for fc2: enabled
Link Up/Down Enable for fc3: disabled
Link Up/Down Enable for fc4: enabled
Link Up/Down Enable for fc5: disabled
Link Up/Down Enable for fc6: enabled
```

```
Link Up/Down Enable for fc7: enabled
Link Up/Down Enable for fc8: disabled
Link Up/Down Enable for ge1: enabled
Link Up/Down Enable for ge2: enabled
System location is: Test lab
```

Related Commands

Command	Description
setup netmgmt	Run the wizard to configure network management.
snmp-server	Configure the storage router for SNMP management.

show software version

To display a list of software versions available on the SN 5428-2 Storage Router, use the **show software version** command.

show software version {*v.x.y* **| all | boot | current}**

Syntax Description

all	Display information about all versions of software available on the storage router.
v.x.y	Display information about the specified software version, including the download file name.
boot	Display information about the version of software that will run when the system is rebooted, including the download file name.
current	Display information about the version of software that is currently running on the storage router, including the download file name.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show software version all** command to display the size of each version of software and the date and time it was built. The display also shows the version of software currently running and the version which will be booted when the system is reset. It includes the protocol and default location from which new software is available for download and the amount of disk space currently available for new software.

Examples

The following is example output from the **show software version all** command:

```
[SN5428-2A]# show software version all
Version               Boot  Hash  Sign  Crash        Size  Date
--------------------  ----  ----  ----  -----  ----------  --------------------
3.3.1-K9              OK    OK    N/A       0  11229.0 KB  Jan 10 09:57 CDT 2003

             Http Url: http://www.cisco.com
          Http Username: phurley
          Http Password: *****

          Proxy Address:
             Proxy Port:
              Proxy Url:
         Proxy Username:
         Proxy Password:
```

```
           Tftp Hostname:
          Tftp Directory:

Software Space Available: 34250.0 KB
         Current Version: 3.3.1-K9
            Boot Version: 3.3.1-K9
```

The following example displays the download file name for the currently running version of software:

```
[SN5428-2A]# show software version current

Version               Boot  Hash  Sign  Crash        Size  Date
--------------------  ----  ----  ----  -----  ----------  --------------------
3.3.1-K9              OK    OK    N/A       0  11229.0 KB  Dec 10 09:57 CDT 2002

Download File Name
--------------------------
sn5428-2-sw-3.3.1-K9.tar

               Http Url: http://www.cisco.com
          Http Username: phurley
          Http Password: *****

          Proxy Address:
             Proxy Port:
              Proxy Url:
         Proxy Username:
         Proxy Password:

          Tftp Hostname:
         Tftp Directory:

Software Space Available: 34250.0 KB
         Current Version: 3.3.1-K9
          Boot Version: 3.3.1-K9
```

Related Commands

Command	Description
delete software version	Remove the specified version of software from the storage router.
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information.
save system	Save selected system configuration information.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

show ssh

To display Secure Shell (SSH) server configuration, use the **show ssh** command.

show ssh

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator and Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to verify SSH is configured for the storage router and that the SSH service is running. If the SSH server is enabled and the SSH service is running, you can still restrict SSH access for specific interfaces by using the **restrict** command.

Examples

The following is example output from the **show ssh** command:

```
[SN5428-2A]# show ssh

SSH Server Configuration

              Status: enabled
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show restrict	Display configurable security settings for the storage router interfaces.
show sessions	Display information about active Telnet, SSH or GUI sessions to the storage router.
show ssh fingerprint	Display SSH key generation status and current public key information.
ssh enable	Enable SSH and start the SSH service.
ssh keygen	Generate the SSH public and private key pairs for the storage router.

show ssh fingerprint

To display the status of SSH key generation and the current public key information for the SN 5428-2 Storage Router, use the **show ssh fingerprint** command.

show ssh fingerprint

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator and Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display the status of the SSH key generation process and to display the existing public key information, including the number of bits used to generate the keys.

Before generating new SSH keys, use this command to verify the key generation process is not currently in process.

Examples

The following is example output from the **show ssh fingerprint** command:

```
[SN5428-2A]# show ssh fingerprint
Key generation status is 'Idle'

1024 da:35:91:9a:fe:70:20:a7:b0:2f:d2:0e:b1:6c:6f:10 admin@SN5428-2A

1024 7f:5e:95:9c:3b:cc:10:eb:62:76:a4:88:48:08:2c:de /ata3/ssh/ssh_host_rsa_key.pub

1024 10:a6:aa:52:6a:ac:44:8a:6f:5f:21:2e:6b:1a:da:fa /ata3/ssh/ssh_host_dsa_key.pub
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show restrict	Display configurable security settings for the storage router interfaces.
show sessions	Display information about active Telnet, SSH or GUI sessions to the storage router.
show ssh	Display SSH server configuration.
ssh enable	Enable SSH and start the SSH service.
ssh keygen	Generate the SSH public and private key pairs for the storage router.

show stack

To display usage of the stack on a per-task basis, use the **show stack** command.

show stack

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator and Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **show stack** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example output from the **show stack** command:

```
[techpubs2]# show stack
Stack Usage by Task

 NAME         ENTRY         TID       SIZE   CUR  HIGH  MARGIN
------------ ------------ -------- ----- ----- ----- -------
tExcTask     excTask      dffe3b8   7984   240   936   7048
tLogTask     logTask      dffba30   4984   224   288   4696
tCrashDump   crashDumpTas d73dd08   8176   160   224   7952
utilMonitor  0x000d8600b8 ca7ca98   9984   296   816   9168
tShell       shell        d909598  39056   464  1072  37984
tSysMon      sysMonRun(in ce5cd48   4088   144  1144   2944
cppNode      IpcNodeLocal d78ac88   9992   232   712   9280
cppListen    IpcNodeLocal d788360   9984   384   584   9400
dpp0Node     IpcNodeLocal d7859a8   9984   232   712   9272
qlFc1        QlogicFC::sc cc73de8   9992   208  2344   7648
qlFc2        QlogicFC::sc cb18de8   9992   208  2344   7648
tAuthServ    authServerTa ca6aca0  15984   448   880  15104
tFtpdTask    0x00000ea660 d930698  11984   336   464  11520
HA_main      HA_main_task c96da38   9992   376  2480   7512
tNuLogWatche tNuLogWatche cce75b8  16368   600  1592  14776
entropyd     0x000cf5397c c986878  16368   144   864  15504
sshmgr       0x000cf53704 c982188  16376   312   376  16000
ewTelnetd    0x000c6882a8 c97df70   8176   240   304   7872
VTP          Vtp::task(vo ca73630   9992   256  1392   8600
tSnmpd       0x0000050af0 ca9e808  28664  1920  2472  26192
tProtoCDP    cdp_prot(voi ca77848  16368   272  3192  13176
tCfgCopy     listWatcher( ccae9e8  16368   200   328  16040
HA_newcfg    HA_newcfg_ta c979c00  15984   200  3832  12152
```

```
HA_monitor   HA_monitor_t c975b68  15984   208  1984  14000
HA_appctrl   HA_appctrl_t c971ad0  15984   240  5760  10224
hdwMonitor   0x000d452410 cab9de8   9984   144  1328   8656
sensorMntr   entitySensor ca861a8   9984   152   280   9704
eeScratch    ExeEng::scra d781c40  19984   184  1336  18648
cppEeIpc     ExeEng::ipcT d772db0  39984   488  3824  36160
dpp0EeIpc    ExeEng::ipcT d75f100  39984   488  3760  36224
nuLogTask    LogTask::tas ccc9a58  19984   200 10456   9528
tSnmpTmr     0x00000508d0 caa0f78   4080   248   312   3768
tSMLMgr      0x000d642c8c ca82f78   9992  3736  4560   5432
tfeTask      ScsiTargetGl c8e39c0   9992   160   712   9280
cppEeJob     ExeEng::jobT d77cc08  39984   168  1848  38136
dpp0EeJob    ExeEng::jobT d768f58  39984   168   648  39336
tNetTask     netTask      da0c958  19984   208  1352  18632
ui           tEmWeb       ca53b60  49144  4376 22944  26200
tSntpcMon    SntpConf::sn cc700c8   7984   224  1904   6080
slpTask      slpd_task    ca63b30  32760   448  1448  31312
srMonitor    srMonitor(vo ca55d78   8176   384  5064   3112
tFcSwMon     FcSwApp::fcs c97bd58   7984   352  4272   3712
idleTask     0x000d8603a4 ca7a170   9984   136   568   9416
INTERRUPT                           5000     0   928   4072
```

Table 12-37 describes the fields in the display.

Table 12-37 Description of Fields in the "show stack" Command Output

Field	Description
NAME	The name of the task.
ENTRY	The task entry point.
TID	The task ID.
SIZE	The maximum size of the task, in bytes.
CUR	The current size of the task.
HIGH	The largest size of the task since the storage router was last started.
MARGIN	The margin between the size of the task and the size in the HIGH field.

Related Commands

Command	Description
show buffers	Display information about buffer pools.
show memory	Display information about memory and related resources.
show modules	Display addressing information related to the software modules.
show task	Display information about the tasks running in the storage router.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show static

To display the currently configured IP host to Fibre Channel (FC) address mappings saved in the storage router, use the **show static** command. This command is only available when the storage router is deployed for static transparent SCSI routing.

show static iscsibindings

Syntax Description

iscsibindings	Display the IP host to FC mappings that are currently configured in the storage router.

Defaults

None.

Command Modes

Administrator and Monitor.

Command History

Release	Modification
3.3.1	This command was introduced.

Usage Guidelines

When the storage router is deployed for static transparent SCSI routing, the IP host to FC address mappings are saved and retained in the storage router when it is restarted. Use the **show static iscsibindings** command to display the mappings that are currently configured in the storage router.

Examples

The following example displays the currently configured mappings:

```
[SN5428-2A]# show static iscsibindings
Interface WWPN             Host IP Address  Host Name
--------- ---------------- ---------------- ------------------------------
fci1      280100065338d6c0 10.1.20.2        iscsi.cisco.testlab
fci1      280200065338d6c0 10.1.4.213       iqn.1987-05.com.cisco.02.0AB08....B6E5CCE.WIN1
fci2      290100065338d6c0 10.1.30.100      iqn.1987-05.com.cisco.02.9FD389....36D3D3.NT10
```

Related Commands

Command	Description
clear static	Clear the mapping of the IP host to Fibre Channel (FC) address for the specified WWPN.

show system

To display a variety of system information about the SN 5428-2 Storage Router, including system name and deployment option, use the **show system** command. A table of information about storage router network interfaces also displays.

show system [from {*filename* **| bootconfig | runningconfig}]**

Syntax Description

from *filename*	(Optional) Display the system configuration information from the specified configuration file. This file must exist in the *savedconfig* directory.
from bootconfig	(Optional) Display the system configuration information from the persistent saved configuration, used when the storage router is restarted.
from runningconfig	(Optional) Display the system configuration information from the currently running configuration.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show system** command to quickly display information about the system configuration, including system name, current software version, date and time, NTP server, name server and domain information.

Use the **from** keyword to display system configuration from the specified configuration file, the system bootable configuration, or the currently running configuration. The system information is displayed in the same format as the **show bootconfig** output.

Examples

The following is example output from the **show system** command:

```
[SN5428-2A]# show system
              System Name: SN5428-2A
      System Deployed For: SCSI routing
        Software Capacity: 59392.0 KB
      Free Software Space: 34350.0 KB
   Configuration Capacity: 14464.0 KB
 Free Configuration Space: 14174.0 KB
             Log Capacity: 29056.0 KB
           Free Log Space: 28892.0 KB
         Software Version: 3.3.1-K9
                Last Reset: Wed Dec 18 20:40:53 GMT+6 2002
             Current Time: Wed Dec 18 22:30:57 GMT+6 2002
                Time Zone: Etc/GMT+6
               NTP Server: 10.1.60.86
             Name Servers: 10.1.40.243(Pri) 10.1.50.249(Sec)
```

```
                  Domain: mystoragenet.com
   Telnet session timeout: 15

                       Model Number  Rev  Serial Number  Part Number
System                 SN 5428-2-K9  A0   SAD051301XB    800-21476-01
Processor              RME060702     A0   SAD05130130    73-7996-04

Device      IP/Netmask                      MAC
lo0         127.0.0.1/8                     00:00:00:00:00:00
mgmt        10.1.10.244/24                  00:01:2c:06:13:70
ha          10.1.20.56/24                   00:01:64:40:ef:c1
ge1
ge2         10.1.0.45/24                    02:02:3d:01:1c:a5
```

Table 12-38 describes the fields in the display.

Table 12-38 Description of Fields in the "show system" Command Output

Field	Description
System Name	The name of the storage router.
System Deployed For	The deployment option (SCSI routing or Transparent SCSI routing).
Software Capacity	The amount of space allocated for software, in kilobytes.
Free Software Space	Total software capacity currently available, in kilobytes.
Configuration Capacity	The amount of space allocated for configuration files, in kilobytes.
Free Configuration Space	Total configuration capacity currently available, in kilobytes.
Log Capacity	The amount of space allocated for log files, in kilobytes.
Free Log Space	Total log capacity currently available, in kilobytes.
Software Version	The version of software that is currently running, such as 3.3.1-K9.
Last Reset	The date and time the system was last reset.
Current Time	The current date and time.
Time Zone	The time zone in which this storage router is located.
NTP Server	The IP address of the time server.
Name Servers	The IP address of the primary and secondary DNS servers.
Domain	The domain to which the storage router belongs.
Telnet session timeout	The amount of time a management session can be inactive before it is timed out, in minutes.
Model Number	The model number for the SN 5428-2 system and processor.
Rev	The revision number for the SN 5428-2 system and processor.
Serial Number	The serial number for the SN 5428-2 system and processor.
Part Number	The part number for the SN 5428-2 system and processor.
Device	The name of the interface.
IP/Netmask	The IP address and subnet mask associated with the named interface.
MAC	The machine address associated with the named interface.

The following is example output from the **show system from bootconfig** command:

```
!
! SYSTEM
!
hostname SN5428-2A
!
! Mgmt Port
!
interface mgmt ip-address 10.1.10.244/255.255.255.0
!
! HA Port
!
interface ha ip-address 10.1.20.56/255.255.255.0
!
! GE
!
interface ge1 autonegotiation autodetect
interface ge1 mtusize 1500
interface ge1 vlan enable
!
! GE
!
interface ge2 autonegotiation autodetect
interface ge2 mtusize 1500
interface ge2 vlan enable
!
! ROUTES
!
ip default-gateway 10.1.10.201
ip route 10.1.30.0/255.255.255.0 10.1.10.201
!
! RIP
!
no ip rip enable
ip rip timers invalid 180
!
! ADMIN LOGIN
!
admin password <password>
!
! MONITOR LOGIN
!
monitor password <password>
!
! SNTP
!
ntp peer 10.1.60.86
clock timezone Etc/GMT+6
!
! SNMP
!
snmp-server community public ro
snmp-server community private rw
no snmp-server host all traps
no snmp-server sendauthtraps
snmp-server linkupdown mgmt
snmp-server linkupdown ha
snmp-server linkupdown fei2
snmp-server linkupdown fci1
snmp-server linkupdown fci2
snmp-server linkupdown ge1
snmp-server linkupdown ge2
snmp-server linkupdown fc0
```

```
snmp-server linkupdown fc1
snmp-server linkupdown fc15
snmp-server linkupdown fc2
snmp-server linkupdown fc3
snmp-server linkupdown fc4
snmp-server linkupdown fc5
snmp-server linkupdown fc6
snmp-server linkupdown fc7
snmp-server linkupdown fc8
!
! DNS
!
ip name-server 10.1.40.243 10.1.50.249
ip domain-name cisco.com
!
! TELNET
!
session-timeout 15
!
! SSH
!
ssh enable
!
! SOFTWARE
!
software http url "http://www.cisco.com"
software http username phurley
software proxy username <password>
!
! HA
!
! ha configuration clustered
!
! LOGGING ROUTE FACILITY
!
logging level notice from all to all
logging level info from all to logfile
!
! RESTRICT
!
restrict mgmt ftp
no restrict mgmt telnet
no restrict mgmt http
no restrict mgmt snmp
restrict mgmt ssl
no restrict mgmt ssh
!
restrict ha ftp
no restrict ha telnet
no restrict ha http
restrict ha snmp
restrict ha ssl
restrict ha ssh
!
restrict ge1 ftp
no restrict ge1 telnet
restrict ge1 http
restrict ge1 snmp
restrict ge1 ssl
restrict ge1 ssh
```

```
!
restrict ge2 ftp
no restrict ge2 telnet
restrict ge2 http
restrict ge2 snmp
restrict ge2 ssl
restrict ge2 ssh
!
!
! CDP
!
cdp enable
cdp timer 60
cdp interface mgmt enable
cdp interface ha enable
cdp interface ge1 enable
cdp interface ge2 enable
```

Related Commands

Commands	Description
hostname	Specify the storage router system name.
ip name-server	Specify the IP addresses of a primary (and optional secondary) DNS.
logging syslog	Identify a remote syslog host to be used to log messages.
ntp peer	Specify the name or IP address of the NTP server with which the storage router will synchronize date and time.
save all	Save all configuration information.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

show task

To display information about tasks running in the SN 5428-2 Storage Router, issue the **show task** command.

show task {*task-id* | **all**}

Syntax Description

task-id	The TID for a specific task, obtained from the **show task all** display. Prefix the TID with *0x*, which indicates a hex number.
all	Display information about all running tasks.

Defaults

None.

Command Modes

Administrator and Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show task** command to view priority, status, and error information for all tasks, and register and stack trace information for a specific task. To display The **show task** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Examples

The following is example output from the **show task all** command:

```
[SN5428-2A]# show task all
Running Tasks

NAME        ENTRY           TID     PRI STATUS       PC       SP       ERRNO   ELAY
---------- ------------ -------- --- ---------- -------- -------- ------- -----
tExcTask    excTask       dffe3b8   0 PEND         10eaf8  dffe2c8   3006b      0
tLogTask    logTask       dffba30   0 PEND         10eaf8  dffb950       0      0
tCrashDump crashDumpTas  d73dd08   0 PEND          b68b8  d73dc68       0      0
utilMonitord8600b8        ca7ca98   1 DELAY         bb2c4  ca7c970       0     42
tShell      shell         d909598   1 PEND         10eaf8  d9093c8   c0002      0
tSysMon     sysMonRun__F  ce5cd48   2 DELAY         bb2c4  ce5ccb8       0   2229
cppNode     nodeTaskExec  d78ac88  40 PEND          b68b8  d78aba0       0      0
cppListen   listener__12  d788360  40 PEND          b68b8  d7881e0       0      0
dpp0Node    nodeTaskExec  d7859a8  40 PEND          b68b8  d7858c0       0      0
qlFc1       scsiTask__8Q  cc73de8  45 PEND+T        b68b8  cc73d18   3d0004    101
qlFc2       scsiTask__8Q  cb18de8  45 PEND+T        b68b8  cb18d18   3d0004    101
tAuthServ   authServerTa  ca6aca0  50 PEND          b68b8  ca6aae0       0      0
tFtpdTask   ea660         d930698  55 PEND          b68b8  d930548       0      0
HA_main     HA_main_task  c96da38  77 PEND          b68b8  c96d8c0  380003      0
tNuLogWatchtNuLogWatche   cce75b8  78 PEND         10eaf8  cce7360   c0002      0
entropyd    cf5397c       c986878  78 DELAY         bb2c4  c9867e8       0     25
sshmgr      cf53704       c982188  78 PEND          b68b8  c982050       0      0
ewTelnetd   c6882a8       c97df70  78 PEND          b68b8  c97de80       0      0
```

```
ui          tEmWeb        ca53b60  79 READY         bbd34  ca53480       0     0
VTP         task__3Vtp    ca73630  80 PEND         10eaf8  ca73530       0     0
tSnmpd      50af0         ca9e808 150 PEND          b68b8  ca9e088       0     0
tProtoCDP   cdp_prot__Fv  ca77848 150 PEND         10eaf8  ca77738       0     0
tCfgCopy    listWatcher_  ccae9e8 160 PEND          b6fd8  ccae920       0     0
HA_newcfg   HA_newcfg_ta  c979c00 160 DELAY         bb2c4  c979b38  380003   111
HA_monitor  HA_monitor_t  c975b68 160 DELAY         bb2c4  c975a98  3d0002    81
HA_appctrl  HA_appctrl_t  c971ad0 160 PEND         10eaf8  c9719e0  380003     0
hdwMonitor  d452410       cab9de8 180 DELAY         bb2c4  cab9d58       0 11318
sensorMntr  entitySensor  ca861a8 180 PEND          b68b8  ca86110       0     0
eeScratch   scratchTask_  d781c40 200 PEND          b68b8  d781b88       0     0
cppEeIpc    ipcTaskExec_  d772db0 200 PEND          b68b8  d772bc8      46     0
dpp0EeIpc   ipcTaskExec_  d75f100 200 PEND          b68b8  d75ef18      46     0
nuLogTask   task__7LogTa  ccc9a58 200 PEND          b68b8  ccc9990  c0002     0
tSnmpTmr    508d0         caa0f78 200 PEND         10eaf8  caa0e80       0     0
tSMLMgr     d642c8c       ca82f78 200 PEND+T        b68b8  ca820e0  3d0004   138
tfeTask     tfeTask__19S  c8e39c0 200 DELAY         bb2c4  c8e3920       0    50
cppEeJob    jobTaskExec_  d77cc08 201 READY         b68b8  d77cb60      31     0
dpp0EeJob   jobTaskExec_  d768f58 201 READY         b68b8  d768eb0       0     0
tNetTask    netTask       da0c958 202 READY         b68b8  da0c888       0     0
tSntpcMon   sntpcMon_tas  cc700c8 248 DELAY         bb2c4  cc6ffe8  710005 312264
slpTask     slpd_task     ca63b30 248 PEND          b68b8  ca63970  380003     0
srMonitor   srMonitor__F  ca55d78 248 DELAY         bb2c4  ca55bf8       0   139
tFcSwMon    fcswMon_Task  c97bd58 248 DELAY         bb2c4  c97bbf8       0   541
idleTask    d8603a4       ca7a170 249 READY         b72dc  ca7a0e0       0     0
```

The following is example output from the **show task** command for TID “dffba30”. Because the TID is a hex number, the TID must be prefixed with *0x*.

```
[SN5428-2A]# # show task 0xdffba30
Registers


  NAME       ENTRY       TID      PRI    STATUS      PC      SP     ERRNO  DELAY
---------- ------------ -------- --- ---------- -------- -------- ------- -----
tLogTask   logTask       dffba30   0 PEND        10eaf8   dffb950       0     0

stack: base 0xdffba30  end 0xdffa6a8  size 4984   high 288    margin 4696

options: 0x6
VX_UNBREAKABLE      VX_DEALLOC_STACK

r0     =        0   sp     =  dffb950   r2     =        0   r3     =        0
r4     =        0   r5     =        0   r6     =        0   r7     =        0
r8     =        0   r9     =        0   r10    =        0   r11    =        0
r12    =        0   r13    =        0   r14    =        0   r15    =        0
r16    =        0   r17    =        0   r18    =        0   r19    =        0
r20    =   180000   r21    =   170000   r22    =   170000   r23    =   180000
r24    =   180000   r25    =   180000   r26    =   180000   r27    = ffffffff
r28    = 10000003   r29    = 10000010   r30    =  dffbc4c   r31    =        0
msr    =     b030   lr     =        0   ctr    =        0   pc     =   10eaf8
cr     = 42000000   xer    =        0

Stack Trace

 f5218 vxTaskEntry    +60 : logTask ()
 9d684 logTask        +30 : msgQReceive ()
 b5594 msgQReceive    +298: qJobGet ()
```

Related Commands

Command	Description
show buffers	Display information about buffer pools.
show memory	Display information about memory and related resources.
show modules	Display addressing information related to the software modules.
show stack	Display the memory stack on a per-task basis.
show tech-support	Display a variety of diagnostic information for use by Cisco Technical Support professionals.

show tech-support

To display the results of several CLI **show** commands useful for debugging purposes, use the **show tech-support** command.

show tech-support

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The **show tech-support** command is designed for debug purposes and should be used under the guidance of a Cisco Technical Support professional.

Use this command to display the output of the following commands, based on the storage router deployment option:

- show system
- show clock
- show software version all
- show cluster
- show admin
- show interface brief
- show interface all
- show interface all stats
- show ip arp
- show ip hosts
- show ip route
- show ip tcp
- show ip udp
- show ip stats
- show ip icmp stats
- show ip route stats
- show ip tcp stats

- shop ip udp stats
- show snmp
- show devices
- show accesslist all
- show scsirouter all
- show bootconfig
- show runningconfig
- show ha node stats
- show ha app list stats
- show ha app all stats
- show diagnostics
- show boot
- show memory
- show task all
- show stack
- show modules
- show buffers
- show debug scsirouter all tfestatus
- show debug fcswitch all
- show debug mailboxtrace all
- show debug rawlundatabase all
- show fcswitch global-nameserver brief
- show fcswitch nameserver brief
- show debug fcswitch tech-support

Examples

The following is abbreviated example output from the **show tech-support** command:

```
[SN5428-2A]# show tech-support

******************************************************
*
*   show tech
*
******************************************************
   Generated: Fri Mar 22 22:05:20 GMT 2002
 System Name: SN5428-2A
******************************************************
*
*   show system
*
******************************************************
```

Related Commands

Command	Description
show accesslist	Display the contents of the named access list or all access lists.
show admin	Display system administrator contact information.
show boot	Display system boot information and startup file parameters.
show bootconfig	Display the bootable configuration, or create a command file based on the bootable configuration.
show buffers	Display information about buffer pools.
show clock	Display the current system date and time, including the system time zone.
show cluster	Display cluster-related operational statistics, including heartbeat information.
show debug	Display debug trace information for the specified SCSI routing instance.
show devices	Display a list of devices discovered on the Fibre Channel interface.
show diagnostics	Display hardware diagnostic test results.
show ha	Display HA operational statistics for the storage router or for a specific application.
show interface	Display operational and configuration information for the specified interface or all interfaces.
show ip	Display entries from the SN 5428-2 Storage Router routing table, and statistics about the protocols used in the storage router network.
show memory	Display information about memory and related resources.
show modules	Display addressing information related to the software modules.
show runningconfig	Display the running configuration, or create a command file based on the running configuration.
show scsirouter	Display configuration and operational information for the named SCSI routing instance.
show snmp	Display the SNMP management configuration information for the storage router.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
show stack	Display the memory stack on a per-task basis.
show system	Display selected system information, including system name.
show task	Display information about the tasks running in the storage router.

show telnet

To display the status of the SN 5428-2 Storage Router Telnet server, use the **show telnet** command.

show telnet

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator and Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display the status of the Telnet server. The Telnet server is enabled and running on the storage router by default. If the Telnet server is enabled, you can still restrict Telnet access to the storage router for specific interfaces by using the **restrict** command.

Examples

The following is example output from the show telnet command:

```
[SN5428-2A]# show telnet

Telnet Server Configuration

              Status: enabled
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
telnet enable	Enable Telnet and start the Telnet server.

show version

To display version information for system-level software and applications, use the **show version** command.

show version

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show version** command for version information about the storage router operating system software, system bootstrap, application software, and CLI.

Examples

The following is example output from the **show version** command:

```
[SN5428-2A]# show version

CISCO SN 5428-2 Storage Router

         CLI Version: 2.1
       iSCSI Version: 0/2 (Min/Max)
    System Bootstrap: 3.3.1-K9
    Operating System: 3.3.1-K9
         Application: 3.3.1-K9
          Web Server: R6_1_0
             OpenSSH: 3.4p1
             OpenSSL: 0.9.6e
                Zlib: 1.1.4

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```

Table 12-39 describes the fields in the display.

Table 12-39 Description of Fields in the "show version" Command Output

Field	Description
CLI Version	The command line interface version number.
iSCSI Version	The iSCSI draft version information (minimum and maximum version that can be used with the SCSI routing instance).

Table 12-39 Description of Fields in the "show version" Command Output (continued)

Field	Description
System Bootstrap	The version of software that will run when the storage router is next restarted.
Operating System	The version of software that is currently running.
Application	The current application version.
Web Server	The version number of the SN 5428-2 web server software.
OpenSSH	The version number of the OpenSSH software, for SSH support.
OpenSSL	The version number of OpenSSL software, for SSL support.
Zlib	The version number of the zlib compression library.

Related Commands

Command	Description
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.

show vlan

To view configuration and operational information about the specified VLAN, use the **show vlan** command.

show vlan [id *vid***] [brief]**

show vlan [id vid] from {*filename* **| bootconfig | runningconfig}**

Syntax Description

id *vid*	(Optional) ID of the VLAN to be displayed.
brief	(Optional) Display name, status, and ports for each VLAN.
config	(Optional) Display detailed configuration information for the specified VLAN or all manually configured VLANs.
from *filename*	Display the configuration information for the specified VLAN or all manually configured VLANs from the specified configuration file. This file must exist in the *savedconfig* directory.
from bootconfig	Display the configuration information for the specified VLAN or all manually configured VLANs from the persistent saved configuration, used when the storage router is restarted.
from runningconfig	Display the configuration information for the specified VLAN or all manually configured VLANs from the currently running configuration.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A VLAN is a group of independent devices that communicate as if they are on the same physical LAN segment but can actually be located anywhere on the network. The storage router dynamically obtains VLAN information from the switch attached to the Gigabit Ethernet interface. Use the **show vlan** command to learn of any VLANs configured on the attached network.

Note VLANs can be manually configured when the storage router is in VTP Transparent mode.

Examples

The following is example output from the **show vlan** command, followed by example output from the **show vlan config** command for the VLAN ID *101*:

```
[SN5428-2A]# show vlan
VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
101  vlanfoo1                         active    ge1, ge2
102  vlanfoo2                         active    ge2

VLAN Type  MTU   Interfaces
---- ----- ----- --------------------------------
101  enet  1500  ge2VLAN101
102  enet  1500  ge2VLAN102

[SN5428-2A]# show vlan id 101 config
vlan 101 name vlanfoo1 mtu 1500
```

Related Commands

Command	Description
restore vlan	Restore VLAN configuration information from the named configuration file.
save all	Save all configuration information, including VLAN information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information, including VLAN information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
show vtp	Display configuration and operational information for VTP.
vlan	Configure a non-VTP VLAN on the storage router.
vtp domain	Assign a VTP domain name to the storage router.
vtp mode	Configure the storage router to operate in client or transparent VTP mode.

show vtp

To display general configuration and status information about the VLAN Trunking Protocol (VTP), use the **show vtp** command.

show vtp [config | stats]

Syntax Description

config	(Optional) Display mode and domain information.
stats	(Optional) Display operational statistics.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

VTP must be in transparent mode to configure VLANs. Use the **show vtp** command to view the current VTP configuration.

Examples

The following is example output from the **show vtp** command, with the storage router in VTP Client mode:

```
[SN5428-2A]# show vtp
Configuration Revision   : 0
Number of existing VLANs : 2
VTP Operating Mode       : Client
VTP Domain Name          : lab1
```

The following is example output from the **show vtp** command, with the storage router in VTP Transparent mode:

```
[SN5428-2A]# show vtp
Configuration Revision   : 0
Number of existing VLANs : 2
VTP Operating Mode       : Transparent
VTP Domain Name          :
```

The following is example output from the **show vtp config** command:

```
[SN5428-2A]# show vtp config
vtp mode client
vtp domain lab1
```

The following is example output from the **show vtp stats** command:

```
[SN5428-2A]# show vtp stats
Summary advertisements received    : 3
Subset advertisements received     : 2
Request advertisements received    : 5
Request advertisements transmitted : 5
```

Related Commands

Command	Description
restore vlan	Restore VLAN configuration information from the named configuration file.
save all	Save all configuration information, including VLAN information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information, including VLAN information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
show vlan	Display configuration and operational information for the specified VLAN or all VLANs.
vlan	Configure a non-VTP VLAN on the storage router.
vtp domain	Assign a VTP domain name to the storage router.
vtp mode	Configure the storage router to operate in client or transparent VTP mode.

show zone

To display configuration and operational information for Fibre Channel fabric zones from the local zoning database, use the **show zone** command.

show zone {*name* **| all | brief}**

Syntax Description

name	Display member type and value for the specified zone.
all	Display member type and value for all zones.
brief	Display member value only for all zones.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display member type and value information for all zones known to the local storage router zoning database.

Examples

The following is example output from the **show zone brief** command. The zone named *testlab* has nine members, including an alias named *testgroupA* and 8 devices identified by WWPNs.

```
[SN5428-2A]# show zone brief
Zone Name            Member value
-------------------- --------------------
testlab              testgroupA
                     201b491585c21911
                     201c2301221155b9
                     1121334455617681
                     2233445566616567
                     2233445566616572
                     2233445566616573
                     1121334455617688
                     1121334455617684

1 zone
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete fcalias	Delete the named alias or the specified alias member.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcswitch	Display information about aliases and their members.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.
zoneset zone	Add a member zone to a zone set.

show zoneset

To display configuration and operational information for Fibre Channel fabric zone sets, use the **show zoneset** command.

show zoneset {*name* | **all** | **brief**}

Syntax Description

name	Display the member count for the specified zone set.
all	Display configuration information for all zone sets.
brief	Display the active flag and the member count only for all zone sets.

Defaults

None

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to display configuration information for zone sets, including the name and number of zones in the zone set and the active flag. This command displays information from the local storage router zoning database.

Examples

The following is example output from the **show zoneset brief** command. The zone set named *labservices* is the active zone set and includes nine members.

```
[SN5428-2A]# show zoneset brief
Zoneset Name         Active Member Count
-------------------- ------ ------------
labservices          true   9
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete fcalias	Delete the named alias or the specified alias member.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show devices	Display a variety of debug information or perform specific troubleshooting activities for Fibre Channel zones.
show fcswitch	Display information about aliases and their members.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.
zoneset zone	Add a member zone to a zone set.

slp findattrs

To discover the attributes of a specific Service Location Protocol (SLP) registered service, use the **slp findattrs** command.

slp findattrs *service* **[***attribute***]**

Syntax Description

service	The SLP service. Use the **slp findsrvs** command to locate the specific service.
attribute	Display the value of the specified service attribute.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to verify that the attributes of advertised targets associated with a SCSI routing instance are correct.

Use the **slp findsrvs** command to display the service information used as arguments in the command.

Examples

The following example discovers the attributes of all *iscsi:target* services:

```
[SN5428-2A]# slp findattrs iscsi:target

(iscsi-name=iqn.1987-05.com.cisco:00.dd6b75bc42ef.chimaera_apps),(alias=chimaera_apps),
(portal-group=1),(auth-addr=any),(auth-name=an)
(iscsi-name=iqn.1987-05.com.cisco.00.d621b8e50a31.chimaera_web),(alias=chimaera_web),
(portal-group=1),(auth-a)
```

The following example discovers the value of the *alias* attribute for all *iscsi:target* services:

```
[SN5428-2A]# slp findattrs iscsi:target alias

(alias=chimaera_apps)
(alias=chimaera_web)
```

Related Commands

Command	Description
scsirouter slp enable	Enable the advertisement of the targets of the named SCSI routing instance with the SLP service.
show slp	Display the status of the SLP service and the interface address where the SLP service is listening for incoming SLP service requests.
slp findsrvs	Locate a SLP registered service of a specific type on the local subnet.
slp findsrvtypes	Discover all SLP registered service types on the local subnet.

slp findsrvs

To locate a Service Location Protocol (SLP) registered service of a specific type on the local subnet where the SN 5428-2 Storage Router is located, use the **slp findsrvs** command.

slp findsrvs *service* **[**(*attribute*=*value*)**]**

Syntax Description

service	The SLP service type. For example, the SLP service type for iSCSI targets is *iscsi:target*.
attribute=*value*	Display the specified service attribute value pair. The attribute value pair must be displayed in parenthesis.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to verify that a SCSI routing instance that is enabled for SLP is registering its accessible targets with the SLP service. The command displays the URLs for the specified SLP registered service types if they are available on the local subnet.

To display a list of all SLP registered service types found on the local subnet, use the **slp findsrvtypes** command. To display attributes for a specific SLP registered service, use the **slp findattrs** command.

Examples

The following is example output from the **slp findsrvs** command. In this example, two targets are found at address 10.1.10.10. The URL includes the iSCSI Name for each target. The targets belong to a SCSI routing instance with a Gigabit Ethernet interface IP address of 10.1.10.10. The SCSI routing instance may be located on the local storage router or on another SN 5428-2 in the network.

```
[SN5428-2A]# slp findsrvs iscsi:target

service:iscsi:target://10.1.10.10:3260/iqn.1987-05.com.cisco:00.d875b8262ff6.disk1,64432
service:iscsi:target://10.1.10.10:3260/iqn.1987-05.com.cisco:00.bd0e6aa3eb51.disk2,64432
```

The following example discovers all SCSI routing instance targets with an alias of *disk1*:

```
[SN5428-2A]# slp findsrvs iscsi:target (alias=disk1)

service:iscsi:target://10.1.10.10:3260/iqn.1987-05.com.cisco:00.d875b8262ff6.disk1,64432
```

Related Commands

Command	Description
scsirouter slp enable	Enable the advertisement of the targets of the named SCSI routing instance with the SLP service.
show slp	Display the status of the SLP service and the interface address where the SLP service is listening for incoming SLP service requests.
slp findattrs	Discover the attributes of a specific SLP registered service.
slp findsrvtypes	Discover all SLP registered service types on the local subnet.

slp findsrvtypes

To discover all Service Location Protocol (SLP) registered services on the local subnet where the SN 5428-2 Storage Router is located, use the **slp findsrvtypes** command.

slp findsrvtypes

Syntax Description

This command has no arguments or keywords.

Defaults

None.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to invoke an SLP user agent tool which looks for SLP registered services on the local subnet. If any SLP services are found, a list of the service types and URLs displays. If SCSI routing instances have SLP enabled and have targets advertised with SLP, the display lists an available SLP service of type *iscsi:target*.

Examples

The following is example output from the **slp findsrvtypes** command:

```
[SN5428-2A]# slp findsrvtypes
service:iscsi:target
```

Related Commands

Command	Description
scsirouter slp enable	Enable the advertisement of the targets of the named SCSI routing instance with the SLP service.
show slp	Display the status of the SLP service and the interface address where the SLP service is listening for incoming SLP service requests.
slp findattrs	Discover the attributes of a specific SLP registered service.
slp findsrvs	Locate a SLP registered service of a specific type on the local subnet.

snmp-server

To configure SNMP management on the SN 5428-2 Storage Router, use the **snmp-server** command. To disable SNMP management or specific host or traps, use the **no** forms of this command.

snmp-server community *community-name* **{ro | rw}**

snmp-server host *A.B.C.D* **[version** *version-number***] traps**

snmp-server linkupdown {all | *if-name***}**

snmp-server location *text-string*

snmp-server {sendauthtraps | sendfrutraps}

no snmp-server host {*A.B.C.D* **| all} traps**

no snmp-server linkupdown {*if-name* **| all}**

no snmp-server {sendauthtraps | sendfrutraps}

Syntax Description

community-name	The name of the community having the specified access (read or write) to the storage router. Enclose the string in quotation marks.
ro	Read-only access. The storage router will respond to this community's GET commands. The default SNMP getcommunity is *public*.
rw	Read/write access. The storage router will respond to this community's SET commands. The default SNMP setcommunity is *private*.
host *A.B.C.D*	The IP address of the first destination host used for notifications (traps). *A.B.C.D* is the dotted quad notation of the IP address. If the command is issued twice, the second IP address becomes the second destination host used for notifications. Version 1 traps will be sent by default.
version *version-number*	(Optional) The SNMP version for the traps. Use 1 to specify version 1 traps; use 2 to specify version 2 traps.
traps	Keyword, indicating the specified version of traps will be send to the designated host.
host all	Remove all destination hosts used for SNMP notifications (traps).
linkupdown *if-name*	Enable or disable SNMP link up/down traps for the specified interface. See Table 12-40 for a list of valid interface names.
linkupdown all	Enable or disable SNMP link up/down traps for all interfaces.
location *text-string*	Provide site-specific location information. If the text string includes spaces or special characters, enclose it in quotation marks. Enter a maximum of 255 characters.
sendauthtraps	Enable or disable authentication failure traps sent when an SNMP request is received with an incorrect community name.
sendfrutraps	Enable or disable entity field replaceable unit (FRU) traps sent when FRU changes occur.

Defaults

The default read-only community name is *public*. This is also known as the *getcommunity*. The default read/write community name is *private*. This is also known as the *setcommunity*. SNMP notifications are disabled by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A variety of network management methods may be used with the storage router, including SNMP. All management methods are enabled by default.

The first issuance of the **snmp-server host** command sets an initial destination host used for traps; the second issuance of the command sets an additional destination host. Version 1 traps are sent by default. To send other trap versions, use the **snmp-server host** command with the **version** keyword.

Link up/down traps can be sent for any valid storage router interface.

Table 12-40 Valid Interface Names

Interface Name	Description
mgmt	The management interface.
ha	The HA interface.
fc*?*	The Fibre Channel interface, for example, fc1 or fc5.
ge*?*	The Gigabit Ethernet interface, for example, ge1 or ge2.

Examples

The following command identifies the IP address *10.3.4.200* as a destination host for SNMP Version 1 traps. You can configure two destination hosts for traps.

```
[SN5428-2A]# snmp-server host 10.3.4.200 traps
```

The following command enables the storage router to send authentication failure traps to the SNMP destination host:

```
[SN5428-2A]# snmp-server sendauthtraps
```

The following command enables the storage router to send SNMP link up/down traps for all interfaces to the SNMP destination host:

```
[SN5428-2A]# snmp-server linkupdown all
```

The following command enables the storage router to send SNMP entity FRU insert/remove traps to the SNMP destination host:

```
[SN5428-2A]# snmp-server sendfrutraps
```

Related Commands

Command	Description
setup mgmt	Run the wizard to configure the management interface.
setup netmgmt	Run the wizard to configure network management.
show snmp	Display the SNMP management configuration information for the storage router.

software http url

To configure the default location from which to download updated software to the SN 5428-2 Storage Router via HTTP protocol, use the **software http url** command.

software http url {*http://servername/path* **| none}**

Syntax Description

http://servername/path	The complete URL identifying the location from which to download storage router software.
none	Delete the current download location and leave the URL blank. Use this keyword to prevent software downloads via HTTP protocol.

Defaults

The default download location is http://www.cisco.com.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Updated SN 5428-2 software is available from the Cisco.com website. It can also be downloaded and stored locally, then transferred to the storage router when necessary via the **software http url** command.

To see the location defined as the current default download location, issue the **show software version all** command.

Examples

The following command sets the default download location to the URL http://www.lab-foo.com/~sn5428-2:

```
[SN5428-2A]# software http url http://www.lab-foo.com/~sn5428-2
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http username	Configure the user name and optional password required to access the default download location.
software proxy	Configure HTTP proxy information.
software proxy url	Specify the default location from which to download updated SN 5428-2 software via HTTP, using a proxy server.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software tftp	Specify the default location from which to download updated SN 5428-2 software via TFTP.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

software http username

To configure an optional user name and password used to retrieve updated SN 5428-2 software from the HTTP download location, use the **software http username** command.

software http username {*webserver-username* | **none**} [**password** *webserver-password*]

Syntax Description

webserver-username	The user name required to retrieve SN 5428-2 software from the download location.
none	Indicates user name and password are not required. Sets these values to *none*. This is the default setting.
webserver-password	(Optional) The password required to retrieve SN 5428-2 software from the download location.

Defaults

By default, the user name and password are set to *none*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show software version all** command to display the current user name configured for retrieval of updated SN 5428-2 software from the HTTP download location.

Use the keyword **none** to indicate that the web server does not require a user name and password to download software, effectively changing the user name and password values to *none*. This is the default setting.

See the **software http url** command for details on setting the location from which to download software.

Examples

The following example sets the user name for HTTP download to *FooAdmin* and the password to *foo*:

```
[SN5428-2A]# software http username FooAdmin password foo
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http url	Specify the default location from which to download updated SN 5428-2 software via HTTP.
software proxy	Configure HTTP proxy information.
software proxy url	Specify the default location from which to download updated SN 5428-2 software via HTTP, using a proxy server.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software tftp	Specify the default location from which to download updated SN 5428-2 software via TFTP.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

software proxy

To configure the address and port of a proxy server to be used when downloading updated software to the SN 5428-2 Storage Router via HTTP protocol, use the **software proxy** command.

software proxy address *address* **[port** *nn***]**

software proxy port *nn*

Syntax Description

address	The IP address or URL of the proxy server. To remove a proxy server address, set the address string to blank, using " ".
nn	(Optional) The port number of the proxy server.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The proxy server will be used to access the proxy URL for HTTP download of software for the storage router. To change the port specification without changing the address, use the **software proxy port** command. Use the **software proxy url** command to configure the default download location.

Examples

The following example configures the proxy address as *10.1.10.126* and port as *32*:

```
[SN5428-2A]# software proxy address 10.1.10.126 port 32
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http url	Specify the default location from which to download updated SN 5428-2 software via HTTP.
software http username	Configure the user name and optional password required to access the default download location.
software proxy url	Specify the default location from which to download updated SN 5428-2 software via HTTP, using a proxy server.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software tftp	Specify the default location from which to download updated SN 5428-2 software via TFTP.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

software proxy url

To configure the default location from which to download updated software to the SN 5428-2 Storage Router via HTTP protocol using the configured proxy server, use the **software proxy url** command.

software proxy url {*http://servername/path* **| none}**

Syntax Description

http://servername/path	The complete URL identifying the location from which to download SN 5428-2 software via the configured proxy server.
none	Delete the current proxy download location and leave the URL blank. Use this keyword to prevent software downloads via the proxy server.

Defaults

The proxy URL is set to *none*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

If you use a proxy server to access locations on the Internet, configure the proxy server address and port number using the **software proxy address** command. The proxy server will be used to access the proxy URL when downloading updated SN 5428-2 software.

Examples

The following example configures the proxy address as *10.1.10.126* and port as *32* and then sets the proxy download URL to http://www.foo-a.com:

```
[SN5428-2A]# software proxy address 10.1.10.126 port 32
[SN5428-2A]# software proxy url http://www.foo-a.com
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http url	Specify the default location from which to download updated SN 5428-2 software via HTTP.
software http username	Configure the user name and optional password required to access the default download location.
software proxy	Configure HTTP proxy information.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software tftp	Specify the default location from which to download updated SN 5428-2 software via TFTP.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

software proxy username

To configure a user name and an optional password to be used to retrieve updated SN 5428-2 software from the proxy download location, use the **software proxy username** command.

software proxy username {*webserver-username* **| none} [password** *webserver-password***]**

Syntax Description

webserver-username	The user name required to retrieve SN 5428-2 software from the proxy download location.
none	Indicates user name and password are not required. Sets these values to *none*. This is the default setting.
webserver-password	(Optional) The password required to retrieve SN 5428-2 software from the proxy download location.

Defaults

By default, the user name and password are set to *none*.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **show software version all** command to display the current user name used to retrieve updated SN 5428-2 software from the proxy download location.

Use the keyword **none** to indicate that the web server does not required a user name and password to download software, effectively changing the user name and password values to *none*. This is the default setting.

See the **software proxy url** command for details on setting the location from which to download software.

Examples

The following example sets the user name for proxy download to *FooAdmin* and the password to *foo*:

```
[SN5428-2A]# software proxy username FooAdmin password foo
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http url	Specify the default location from which to download updated SN 5428-2 software via HTTP.
software http username	Configure the user name and optional password required to access the default download location.
software proxy	Configure HTTP proxy information.
software proxy url	Specify the default location from which to download updated SN 5428-2 software via HTTP, using a proxy server.
software tftp	Specify the default location from which to download updated SN 5428-2 software via TFTP.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

software tftp

To configure host and directory information to be used when downloading updated software to the SN 5428-2 Storage Router via the Trivial File Transfer Protocol (TFTP), use the **software tftp** command.

software tftp directory {*directory_name* | **none**}

software tftp hostname *hostname* [**directory** *directory_name*]

Syntax Description

directory_name	The name of the TFTP base directory.
none	Remove the directory setting, effectively disabling the use of TFTP protocol.
hostname	The name of the remote TFTP host. To remove the TFTP configuration, set the host name to blank, using " ".

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to set the required TFTP parameters for downloading software updates via TFTP protocol. If the base directory is the default, *tftpboot*, omit the directory keyword.

Use the **show software version all** command to display the current TFTP settings.

Examples

The following example sets the TFTP hostname to *TFTPHost1* and the directory to */mytftp*:

```
[SN5428-2A]# software tftp hostname TFTPHost1 directory /mytftp
```

Related Commands

Command	Description
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http url	Specify the default location from which to download updated SN 5428-2 software via HTTP.
software http username	Configure the user name and optional password required to access the default download location.
software proxy	Configure HTTP proxy information.
software proxy url	Specify the default location from which to download updated SN 5428-2 software via HTTP, using a proxy server.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software version	Specify the version of software to run when the storage router is restarted.
verify software version	Check the specified software version for problems.

software version

To specify the version of software to run the next time the SN 5428-2 Storage Router is restarted, use the **software version** command. This command forces a system reset and changes the running version of SN 5428-2 software.

software version *v.x.y*

Syntax Description

v.x.y	The version of software to be run when the system is reset.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

This command performs necessary system modifications to assure that the new software version can be run. It causes a system reset, and the new version of software will be run when the reset is complete.

In a cluster environment, this command may temporarily suspend normal HA communications, causing a failover of any SCSI routing instances active on the storage router. Any instances with the **primary** attribute set to name of this SN 5428-2 will resume running on the storage router after it is rebooted.

Use the **show software version all** command to display the list of available versions, the currently running version, and the boot version that will run when the system is reset.

Examples

The following is example output from the **software version** command:

```
[SN5428-2A]# software version 3.3.1-K9
Module                    Size  Status   MD5 Digest
--------------------  --------  -------  --------------------------------
vxWorks                3538262  OK       88f817ff917bceb3d1467b593200e1cf
vxWorks.sym             240542  OK       3211a06964d8557cb58dc6a270b050bd
bootrom_uncmp.hex      1982050  OK       dd0b9da60b1dfe093072ded8def3ebad
sysInit.out             210292  OK       300a7d3917216ec2e7496aca47f2483b
crashDump.out            14019  OK       76861fee62b29bd9b97f9f9a5d253c81
snmp_trapfuncs.out         554  OK       e8e18bcc4c3ba1146ee48a0ad92fa7af
nuEvents.out             18555  OK       3da8de0cc6d45ee0718ac5a1d32058ee
ha.out                   40192  OK       443298870c441e39bad8382b62875943
confNode.out             12237  OK       74a48c89bee7909acca4deddd911fb39
authServer.out           31899  OK       1bb37d8b2e4d67832c2f55f8d62d34ca
drv.out                  31016  OK       5f44307b7e53e40f29001a4283509000
qlogic.out              489356  OK       698067006ce125cc9be243bad2763abc
qlpt.out                 83569  OK       23e03f4ff2f050b666c68b5bba4d6220
i82543.out               59246  OK       6c2ffcb13ef750ff5dfd0274fbe58026
smlApi.out               31018  OK       6a737f9df89c598ef0261e84421a5359
vtp.out                  17215  OK       cba9a0a1168f95298525631c9e6188c2
```

```
scsiTargetFE.out          88822  OK       377ded7893165332e86a7c96d93b80d9
scsiTargetBE.out          49141  OK       fae10864fcf9d8cf4d3a297cc0056454
virtdev.out                 303  OK       ce37770b184c0a2bdbc47fb3e5658843
scsiTcpAuth.out            8424  OK       cee026cfeb1c1624a94e26b77bf848e2
scsiTcpServer.out        102505  OK       932eeab0c617fd5ed73a010316b2f551
scsiTcpClient.out         69382  OK       fcec601fb7860c38619715b1ce037c9c
ttcp.out                  22137  OK       5d596240993cbf6de71df41dbe3bd0dd
confMgmt.out               6848  OK       30f69d677a7674b5a92f156845a8a986
hdwmon.out                12941  OK       87c93f92da43619259acc5cfc5961019
diag.out                  81158  OK       cf563228d268d18fb350edf42d849125
confXML.out               48350  OK       7de86cabbe534da9af356e8664140c94
confObj.out              163103  OK       eb0c2c68679b34c57ccb006ef36369d9
openssl.out              515430  OK       80748cb3d9d7612e8be3f3fe4fcbe735
openssh.out              192180  OK       e99e62aaf3ce8b4e05662089eaf68eaf
clusterApp.out            23404  OK       7412b137225f425ce73f9c752ffa10c1
cdp.out                   27094  OK       d06cd80dd8b3b85bb25c45cf0f597069
systemApp.out             98629  OK       27667fecc8d270e8f79747a2ad75883c
ipRouter.out              16272  OK       9cfc531fc6c22aa0200e67c88ee2f531
srMon.out                 14498  OK       3c7237e46a412c2677c3e5d04e0d31e7
scsiRouter.out            64024  OK       0d6fbe40d4f99bf0b530c670c8b9377f
frameRacer.out            24943  OK       86c7c0125f49dc10f2bf7c16a3ad18cd
authServerApp.out         19161  OK       d668e5ccc60e08e5337e84c510d9faa9
fcSwApp.out               57192  OK       8088e0658387e3d60148b611baac21f6
fdisk.out                 14261  OK       5d005976ef3f5d78a2f0c8d75eccb0ca
sysMon.out                 3218  OK       cd52039491e1c180c9755cf7b09b640b
ui.out                  1422297  OK       f418df3095c77d12863d623a6000daf8
snmp_util.out              2892  OK       1bd6515766e6bc3240a115a4710ff238
mib2.out                  24520  OK       c16353f4c3fc9701964b48d061f649b9
ifx.out                    8995  OK       5e2816c6eaec3cebafb2e8a2a794f6d8
ether.out                  3712  OK       df5d6984ed1d2c5c1bb65f56771c33af
mau_if.out                 5240  OK       9b1cbc21174f7f5295d178598ac661e8
mau_neg.out                3239  OK       eab35f86fb247718026b674c449a2b8a
entity.out                 8358  OK       712c38391842f1fdca3b0dbf90a9ac91
entity_sensor.out          5170  OK       67d0bda3b45a6dc283477bf5e4956d93
cdp_snmp.out               6957  OK       6321d9b6ce2efb635120a7389bca6973
iscsi_mib.out             21170  OK       a91cb9c0409701b8f3aeb7909b88897f
fcmgmt_fcsw.out           24181  OK       23e125253b7698f744044cce1ec60b28
fcmgmt.out                22271  OK       b52d9b4b9c0e1bf4698bab06e47f8619
snmpApp.out                3751  OK       508c923df0bfb1a7466ce9af392b482a

Disk Space (required/available): 4185180/31494144 bytes

Required switch version: (V1.4-43-0) [code=0x0104002b]
Active switch version:   (V1.4.0.43-0) [code=0x0104002b]
Fallback switch version: (V1.4.3.2-0) [code=0x01040302]
Mar 18 17:38:17: %UI-5-SV: Switch Version: [V1.4.0.43-0]

Please do *NOT* shutdown or reboot the system until the software
update process completes. A fatal error could occur if you shutdown
or reboot the system before the software update process completes.

Attempt 1:
  Gathering system files...
  Verifying checksums... OK
  Updating system files. OK
  Updating flash device. File [/ata0/software/3.3.1-K9/bootrom_uncmp.hex]opened
successfully.

Done reading.

Mar 18 17:39:47: %UI-5-SSWV5: Software activation passed: 3.3.1-K9
The software update process was successful. You must reboot the system
in-order for the new software version to take effect.
```

Related Commands

Command	Description
delete software version	Remove the specified version of software from the storage router.
download software	Download the list of available software versions or the specified version of software from the named location.
save all	Save all configuration information, including default download location for updated SN 5428-2 software.
save system	Save selected system configuration information, including default download location for updated SN 5428-2 software.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.
software http url	Specify the default location from which to download updated SN 5428-2 software via HTTP.
software http username	Configure the user name and optional password required to access the default download location.
software proxy	Configure HTTP proxy information.
software proxy url	Specify the default location from which to download updated SN 5428-2 software via HTTP, using a proxy server.
software proxy username	Configure the user name and optional password required to access the proxy URL.
software tftp	Specify the default location from which to download updated SN 5428-2 software via TFTP.
verify software version	Check the specified software version for problems.

ssh enable

To enable Secure Shell (SSH) for the SN 5428-2 Storage Router and to start the SSH service, use the **ssh enable** command. To disable SSH and stop the SSH service, use the **no** form of this command.

ssh enable

no ssh enable

Syntax Description

This command has no arguments or keywords.

Defaults

SSH is enabled and the SSH service is started by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to enable SSH for the storage router and start the SSH service. SSH can be used in place of Telnet to access the SN 5428-2 for management sessions.

If the SSH server is enabled and the SSH service is running, you can still restrict SSH access to the SN 5428-2 for specific interfaces by using the **restrict** command.

Examples

The following example disables SSH and terminates the SSH service:

```
[SN5428-2A]# no ssh enable
*[SN5428-2A]# Jul 26 10:14:48: %UI-5-SSHAST: Stopping SSH service
```

The following example enables SSH and starts the SSH service:

```
[SN5428-2A]# ssh enable
[SN5428-2A]# Jul 26 10:14:55: %UI-5-SSSHS: Starting SSH service
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show ssh	Display SSH server configuration.
show ssh fingerprint	Display SSH key generation status and current public key information.
ssh keygen	Generate the SSH public and private key pairs for the storage router.

ssh keygen

To generate the SSH public and private key pair for the SN 5428-2 Storage Router, use the **ssh keygen** command.

ssh keygen [bits *nn***]**

Syntax Description

bits *nn*	Specify the number of bits to be used for the key encryption. Enter a value in the range of 512 to 3072. The default is 1024 bit.

Defaults

1024 bit public and private keys are generated for the storage router.

Command Modes

Administrator or Monitor.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The SN 5428-2 Storage Router supports Secure Shell (SSH) protocol (version 2) as a replacement for Telnet for management sessions. SSH is a de-facto standard replacement for traditional Rlogin and Telnet that provides heavy-duty encryption and authentication for interactive sessions.

The storage router supports a single SSH management session. SSH is enabled by default, but connections are not accepted until host keys are generated using the **ssh keygen** command. SSH connections accept the Monitor mode login for authentication only; you must issue the **enable** CLI command to gain Administrator access.

If the SSH server is enabled and the SSH service is running, you can still restrict SSH access to the storage router for specific interfaces by using the **restrict** command.

After generating public/private key pairs, use the **show ssh fingerprint** command to display SSH key generation status and the current key information.

Examples

The following is example output from the **ssh keygen** command, followed by the **show ssh fingerprint** command. By default, the host key pair is generated using 1024-bit encryption.

```
[SN5428-2A]# ssh keygen
Generating all 1024 bit public/private key pairs

The time to complete this operation will vary with the key size.
Use 'show ssh fingerprint' to display status.

[SN5428-2A]# show ssh fingerprint
Key generation status is 'Idle'

1024 da:35:91:9a:fe:70:20:a7:b0:2f:d2:0e:b1:6c:6f:10 admin@SN5428-2A
1024 7f:5e:95:9c:3b:cc:10:eb:62:76:a4:88:48:08:2c:de /ata3/ssh/ssh_host_rsa_key.pub
1024 10:a6:aa:52:6a:ac:44:8a:6f:5f:21:2e:6b:1a:da:fa /ata3/ssh/ssh_host_dsa_key.pub
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show ssh	Display SSH server configuration.
show ssh fingerprint	Display SSH key generation status and current public key information.
ssh enable	Enable SSH and start the SSH service.

tacacs-server host

To specify a TACACS+ server to be used for AAA authentication services, use the **tacacs-server host** command. Use the **no** form of this command to delete the specified host.

tacacs-server host *ip-address* **[auth-port** *port-number***] [timeout** *seconds***] [key** *key-string***]**

no tacacs-server host *ip-address* **[auth-port** *nn***]**

Syntax Description

ip-address	The IP address of the TACACS+ server.
auth-port *port-number*	(Optional) The server port number. Valid port numbers range from 1 to 65535. If unspecified, the port number defaults to 49.
timeout *seconds*	(Optional) The amount of time the storage router should wait for a reply from a TACACS+ server before timing out. This setting overrides the global setting of the **tacacs-server timeout** command. If no timeout value is specified, the global value is used.
key *key-string*	(Optional) The authentication and encryption key for all TACACS+ communication between the storage router and this TACACS+ server. The character string must match the key used by the TACACS+ daemon. This key overrides the global setting of the **tacacs-server key** command. If no key string is specified, the global value is used. If spaces are part of the key string, enclose the string in quotation marks.

Defaults

No TACACS+ server is specified.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

AAA authentication services are used to provide iSCSI authentication for IP hosts requesting access to storage resources.

- You can use multiple **tacacs-server host** commands to specify multiple TACACS+ servers. The software searches for servers in the order in which you specify them.
- If no server-specific timeout or key values are specified, the global values apply to each TACACS+ server.
- If you use spaces in the key, enclose the key in quotation marks.

Use the **aaa group server tacacs+ server** command to add a TACACS+ server to a server group. If you delete a TACACS+ server, delete the server from the TACACS+ server using the **no aaa group server tacacs+ server** command.

Note Verification of IP addresses in a server group occurs only at runtime. If a TACACS+ server group contains an IP address that is not defined as a TACACS+ server, the authentication process generates error messages and the IP address is skipped. This could cause unexpected authentication failures.

Examples

The following example specifies the server with IP address 172.29.39.46 as the TACACS+ server and uses the default port for authentication:

```
[SN5428-2A]# tacacs-server host 172.29.39.46
```

The following example specifies port 52 as the destination port for authentication requests on the TACACS+ server 172.29.39.46:

```
[SN5428-2A]# tacacs-server host 172.29.39.46 auth-port 52
```

The following example specifies the server with IP address 172.29.39.46 as the TACACS server, uses ports 52 as the authorization port, sets the timeout value to 6, and sets *tac123* as the encryption key, matching the key on the TACACS+ server:

```
[SN5428-2A]# tacacs-server host 172.29.39.46 auth-port 52 timeout 6 key tac123
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
ip tacacs sourceinterface	Specify a single network interface to be used as the source IP address for all outgoing AAA authentication requests to TACACS+ servers.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server key	Sets the global authentication and encryption key for all TACACS+ communications between the storage router and the TACACS+ daemon.
tacacs-server timeout	Sets the interval the storage router waits for a TACACS+ server to reply.

tacacs-server key

To set the authentication and encryption key used for all TACACS+ communications between the SN 5428-2 Storage Router and the TACACS+ daemon, use the **tacacs-server key** command. To disable the key, use the **no** form of this command.

tacacs-server key *key-string*

no tacacs-server key

Syntax Description

key-string	The authentication and encryption key string to be used for all TACACS+ communications, in unencrypted text. If spaces are part of the key string, enclose the string in quotation marks.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1.	This command was introduced.

Usage Guidelines

After using the **aaa authentication iscsi** command to configure the iSCSI authentication list to use TACACS+ authentication services, use the **tacacs-server key** command to set the global authentication and encryption key. The key entered as part of the command must match the key used on the TACACS+ daemon. If spaces are part of the key string, enclose the key string in quotation marks.

To override the global key for a specific TACACS+ server, use the **tacacs-server host** command with the **key** keyword.

Examples

The following example sets the global authentication and encryption key to *my TACACS key string*:

```
[SN5428-2A]# radius-server key "my TACACS key string"
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
ip tacacs sourceinterface	Specify a single network interface to be used as the source IP address for all outgoing AAA authentication requests to TACACS+ servers.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
tacacs-server timeout	Sets the interval the storage router waits for a TACACS+ server to reply.

tacacs-server timeout

To set the global interval that the SN 5428-2 Storage Router waits for a TACACS+ server to reply, use the **tacacs-server timeout** command.To restore the default, use the **no** form of this command.

tacacs-server timeout *seconds*

no tacacs-server timeout

Syntax Description

seconds	The global timeout value, in seconds. Enter a value in the range of 1 to 1000. The default is 5.

Defaults

The timeout value defaults to five seconds.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to set the number of seconds the storage router waits for a TACACS+ server to reply before timing out.

To override the global timeout value for a specific TACACS+ server, use the **tacacs-server host** command with the **timeout** keyword.

Examples

The following example sets the global timeout value to 10. You may want to increase the timeout value if you have network problems or if TACACS+ servers are slow to respond, causing persistent timeouts when a lower timeout value is used.

```
[SN5428-2A]# tacacs-server timeout 10
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa group server tacacs+	Create a named group of TACACS+ servers for AAA authentication services.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
ip tacacs sourceinterface	Specify a single network interface to be used as the source IP address for all outgoing AAA authentication requests to TACACS+ servers.
radius-server host	Configure remote RADIUS servers for AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.
tacacs-server host	Configure remote TACACS+ servers for AAA authentication services.
tacacs-server key	Sets the global authentication and encryption key for all TACACS+ communications between the storage router and the TACACS+ daemon.

telnet enable

To enable Telnet for the SN 5428-2 Storage Router and to start the Telnet server, use the **telnet enable** command. To disable Telnet and stop the Telnet server, use the **no** form of this command.

telnet enable

no telnet enable

Syntax Description

This command has no arguments or keywords.

Defaults

Telnet is enabled and the Telnet server is started by default.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command to enable Telnet for the storage router and start the Telnet server.

If Telnet is enabled and the Telnet server is running, you can still restrict Telnet access to the storage router for specific interfaces by using the **restrict** command.

Examples

The following example disables Telnet and stops the Telnet server:

```
[SN5428-2A]# no telnet enable
```

The following example enables Telnet and starts the Telnet server:

```
[SN5428-2A]# telnet enable
```

Related Commands

Command	Description
restrict	Secure access to storage router interfaces by communications protocols and services.
show telnet	Display the status of the Telnet server.

username password

To build a local user name database for use with the local method of AAA authentication services, use the **username password** command. Use the **no** form of this command to delete the specified user name.

username *user-name* **password** *password-string*

no username *user-name*

Syntax Description

user-name	A valid user name. Enter a maximum of 63 characters.
password-string	The password associated with the specified user name. If the password is encrypted (starts with "9"), enter a maximum of 170 characters. If the password is unencrypted (starts with "0"), enter a maximum of 66 characters. If the password is entered as an unencrypted text string, enter a maximum of 64 characters.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use the **username password** command to build the local username database. The AAA authentication service, *local-case*, performs a case-sensitive user name match; the *local* service user name match is not case-sensitive. Both *local* and *local-case* use case-sensitive password matching for authentication.

Use the **aaa authentication iscsi** or **aaa authentication login** command to configure the an authentication list to use *local* or *local-case* authentication services.

To display the contents of the local username database, issue the **show aaa** command.

The following rules apply to passwords:

- Passwords are entered in clear text. However, they are changed to "XXXXX" in the CLI command history cache, and are stored in the local username database in an encrypted format.
- If the password contains embedded spaces, enclose it with single or double quotes.
- After initial entry, passwords display in their encrypted format. Use the **show aaa** command to display the local username database entries. The following is an example display:

```
username "foo" password "9 ea9bb0c57ca4806d3555f3f78a4204177a"
```

  The initial "9" in the example display indicates that the password is encrypted.

- You can re-enter an encrypted password using the normal **username password** command. Enter the encrypted password in single or double quotes, starting with 9 and a single space. For example, copying and pasting *password "9 ea9bb0c57ca4806d3555f3f78a4204177a"* from the example above into the **username pat** command would create an entry for *pat* in the username database. The user named *pat* would have the same password as the user named *foo*. This functionality allows user names and passwords to be restored from saved configuration files.
- When entering a password, a zero followed by a single space indicates that the following string is not encrypted; 9 followed by a single space indicates that the following string is encrypted. To enter a password that starts with 9 or zero, followed by one or more spaces, enter a zero and a space and then enter the password string. For example, to enter the password "*0 123*" for the user named *pat*, enter this command:

  ```
  username pat password "0 0 123"
  ```

  To enter the password "*9 73Zjm 5*" for user name *lab1*, use this command:

  ```
  username lab1 password '0 9 73Zjm 5'
  ```

Examples

The following example configures two user names (*foo* and *foo2*) and password (*foopassword* and *foo2password*):

```
[SN5428-2A]# username foo password foopassword
[SN5428-2A]# username foo2 password foo2password
```

To display the user name database, issue the **show aaa** command. The following is example output from the **show aaa** command:

```
[SN5428-2A]# show aaa
aaa new-model
aaa authentication iscsi default group tacacs+ local none
username foo password <password>
username foo2 password <password>
```

Related Commands

Command	Description
aaa authentication enable	Configure AAA authentication services for Administrator mode access to the SN 5428-2 Storage Router via the CLI **enable** command.
aaa authentication iscsi	Configure the AAA authentication services to be used for iSCSI authentication.
aaa authentication login	Configure AAA authentication services for Monitor mode access to the SN 5428-2 Storage Router via the CLI.
aaa generate password	Generate a long random password.
aaa test authentication	Enable testing of the specified AAA authentication list.
debug aaa	Enable debugging for the AAA authentication services.
restore aaa	Restore AAA authentication services from the named configuration file.
save aaa	Save the current AAA configuration information.
scsirouter authentication	Enable iSCSI authentication for the named SCSI routing instance.
show aaa	Display AAA configuration information.

verify software version

To check the specified software version for problems, issue the **verify software version** command.

verify software version {*version-id* **| all | boot | current}**

Syntax Description

version-id	A specific version of software, which must be available to the storage router.
all	Verify all software versions available to the storage router.
boot	The software version that is set to boot at the next system restart.
current	The software version that is currently running.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Use this command after downloading software to verify that the download completed successfully and that the downloaded software is bootable. The size and the status of each module is verified.

Examples

The following is example output from the **verify software version** command:

```
[SN5428-2A]# verify software version 3.3.1-K9

Module                    Size  Status   MD5 Digest
--------------------  --------  -------  --------------------------------
vxWorks                3538310  OK       8eedbb49e12069825d90966d5ea97a74
vxWorks.sym             240542  OK       afbd05b7723a70c3c2eeafde1c13ec90
bootrom_uncmp.hex      1982185  OK       ecc6f45364e76702419cee1246737a3a
sysInit.out             210292  OK       a250add5f1358c94631ff5f91103e247
crashDump.out            14019  OK       76861fee62b29bd9b97f9f9a5d253c81
snmp_trapfuncs.out         554  OK       e8e18bcc4c3ba1146ee48a0ad92fa7af
nuEvents.out             18554  OK       d90d609ef8ad44b60d80ae9ac2ac0ea7
ha.out                   40192  OK       443298870c441e39bad8382b62875943
confNode.out             12237  OK       74a48c89bee7909acca4deddd911fb39
authServer.out           31899  OK       1bb37d8b2e4d67832c2f55f8d62d34ca
drv.out                  31016  OK       5f44307b7e53e40f29001a4283509000
qlogic.out              489130  OK       d9050e9fccfcc0f0e2c0ec2386b63acc
qlpt.out                 83569  OK       23e03f4ff2f050b666c68b5bba4d6220
i82543.out               59246  OK       6c2ffcb13ef750ff5dfd0274fbe58026
smlApi.out               31018  OK       6a737f9df89c598ef0261e84421a5359
vtp.out                  17215  OK       cba9a0a1168f95298525631c9e6188c2
scsiTargetFE.out         88754  OK       6c3daf47e5e2dbd2911fd86df28826e3
scsiTargetBE.out         49141  OK       fae10864fcf9d8cf4d3a297cc0056454
```

```
virtdev.out                303  OK       ce37770b184c0a2bdbc47fb3e5658843
scsiTcpAuth.out           8424  OK       cee026cfeb1c1624a94e26b77bf848e2
scsiTcpServer.out       102480  OK       263b94e089979b927afd8cecb14f988f
scsiTcpClient.out         69382  OK       fcec601fb7860c38619715b1ce037c9c
ttcp.out                  22137  OK       5d596240993cbf6de71df41dbe3bd0dd
confMgmt.out               6848  OK       30f69d677a7674b5a92f156845a8a986
hdwmon.out                12941  OK       87c93f92da43619259acc5cfc5961019
diag.out                  78975  OK       0368ebbee6bdff89cb7ed98e597be9ae
confXML.out               48350  OK       7de86cabbe534da9af356e8664140c94
confObj.out              163180vOK       985bc57d5c5dd32cead34cd401c84e07
openssl.out               515026  OK       1109b92a3efcbf26689f25a1bf7993a0
openssh.out               191979  OK       f7d00201642055e6277d2a770b44e8eb
clusterApp.out             23404  OK       7412b137225f425ce73f9c752ffa10c1
cdp.out                    27094  OK       d06cd80dd8b3b85bb25c45cf0f597069
systemApp.out              98629  OK       27667fecc8d270e8f79747a2ad75883c
ipRouter.out               16272  OK       9cfc531fc6c22aa0200e67c88ee2f531
srMon.out                  14498  OK       3c7237e46a412c2677c3e5d04e0d31e7
scsiRouter.out             64023  OK       162d920a21dd8fe54884ef652c0eb30a
frameRacer.out             24943  OK       86c7c0125f49dc10f2bf7c16a3ad18cd
authServerApp.out          19161  OK       d668e5ccc60e08e5337e84c510d9faa9
fcSwApp.out                54609  OK       0314888330be2e0fb59083f54e27db48
fdisk.out                  14261  OK       5d005976ef3f5d78a2f0c8d75eccb0ca
sysMon.out                  3218  OK       cd52039491e1c180c9755cf7b09b640b
ui.out                   1418774  OK       ccb23ff8c71d803a02f358e409d28948
snmp_util.out               2892  OK       1bd6515766e6bc3240a115a4710ff238
mib2.out                   24520  OK       c16353f4c3fc9701964b48d061f649b9
ifx.out                     8995  OK       5e2816c6eaec3cebafb2e8a2a794f6d8
ether.out                   3712  OK       df5d6984ed1d2c5c1bb65f56771c33af
mau_if.out                  5240  OK       9b1cbc21174f7f5295d178598ac661e8
mau_neg.out                 3239  OK       eab35f86fb247718026b674c449a2b8a
entity.out                  8358  OK       712c38391842f1fdca3b0dbf90a9ac91
entity_sensor.out           5170  OK       67d0bda3b45a6dc283477bf5e4956d93
cdp_snmp.out                6957  OK       6321d9b6ce2efb635120a7389bca6973
iscsi_mib.out              21171  OK       7b1977f687ffb3f23272eb04f1d03bb7
fcmgmt_fcsw.out            24181  OK       23e125253b7698f744044cce1ec60b28
fcmgmt.out                 22271  OK       15de1b02953f6e10c01362553ed28e75
snmpApp.out                 3751  OK       508c923df0bfb1a7466ce9af392b482a
```

Related Commands

Command	Description
delete software version	Remove the specified version of software from the storage router.
download software	Download the list of available software versions or the specified version of software from the named location.
show software version	Display a list of software versions available on the storage router, including the currently running version and the version that will run the next time the storage router is restarted.

vlan

To configure a VLAN on the SN 5428-2 Storage Router, use the **vlan** command. To delete a VLAN, use the **no** form of this command.

vlan *vid* **[name** *vlan_name***] [mtusize** *nn***]**

no vlan *vid* **[force]**

Syntax Description

vid	VLAN identification (VID) number. Enter an integer from 1 to 4095.
name *vlan_name*	(Optional) The name of the VLAN, which can be up to 32 characters in length. If not specified, the default VLAN name has *VLAN* as the prefix followed by the VID, left padded to four bytes (for example, VLAN0002, or VLAN0045).
mtusize *nn*	The size of the maximum transfer unit, in bytes. *nn* is an integer from 1500 to 9000. The default MTU is 1500.
force	(Optional) Keyword that overrides normal protections, allowing the action to be performed.

Defaults

The default VLAN name is comprised of the prefix *VLAN* and the VID, left padded to four bytes. The default MTU size is 1500.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.
3.3.1	The **force** keyword was added.

Usage Guidelines

In a cluster environment, VLAN management functions are handled by a single storage router. To determine which storage router is performing VLAN management functions, issue the **show cluster** command. If you issue the **vlan** command from a storage router that is not performing VLAN management functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

VLANs are a cluster-wide configuration item. When configured and saved to the bootable configuration, HA communications will propagate the VLAN information to all storage routers in the cluster. You can configure a maximum of 16 logical interfaces (VLANs associated with IP addresses) per physical Gigabit Ethernet interface in the SN 5428-2 or cluster.

VLAN information can only be configured when the storage router is in VTP Transparent mode. In transparent mode, received VTP packets are ignored and VLAN configuration information is retrieved from the high availability cluster.

The storage router uses 802.1Q VLAN encapsulation to carry VLAN information on packets sent and received on the Gigabit Ethernet interface. The 802.1Q packet tag is a four-byte field inserted between the source MAC address and ether-type fields in the layer 2 header. It consists of a two-byte Tag Protocol Identifier (TPID) field and a two-byte Tag Control Information (TCI) field. The TPID contains the "protocol type" field (0x8100), which identifies the packet as a valid 802.1Q tagged packet. The TCI contains the 12-bit VLAN Identifier (VID) field and a 3-bit User Priority (UP) field.

Use the **vlan** command to locally configure VLANs when the storage router is connected to a switched network that does not support VTP but does support 802.1Q VLANs.

VLANs can only be deleted if they are not in use. Use the **force** keyword to bypass this restriction and delete a VLAN that is currently in use.

Examples

The following set of commands places the storage router in VTP Transparent mode and configures a VLAN named *weblan001* on the storage router. The VID is 45.

```
[SN5428-2A]# vtp mode transparent
[SN5428-2A]# Jul 30 15:24:02:Vtp:AS_NOTICE :VTP changed to transparent mode
[SN5428-2A]# vlan 45 name weblan001
[SN5428-2A]# Jul 30 15:25:45:Vtp:AS_NOTICE :VLAN 45 added (name=VLAN0045, mtu=1500)
```

Related Commands

Command	Description
restore vlan	Restore VLAN configuration information from the named configuration file.
save all	Save all configuration information, including VLAN information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information, including VLAN information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
show vlan	Display configuration and operational information for the specified VLAN or all VLANs.
show vtp	Display configuration and operational information for VTP.
vtp domain	Assign a VTP domain name to the storage router.
vtp mode	Configure the storage router to operate in client or transparent VTP mode.

vtp domain

To assign a VLAN Trunking Protocol (VTP) domain name to the SN 5428-2 Storage Router, use the **vtp domain** command. VLAN information will not be accepted from a switch which is in a different domain.

vtp domain {*domain_name* | **none**}

Syntax Description

domain_name	The name of the domain to which the storage router belongs.
none	The storage router is not assigned to a specific domain. If the storage router is in VTP Client mode, it will assign itself to the first domain from which it receives a VTP message. This is the default.

Defaults

None. The storage router will assign itself to the first domain from which it receives a VTP message.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

In a cluster environment, VTP configuration functions are handled by a single storage router. To determine which storage router is performing VTP configuration functions, issue the **show cluster** command. The storage router that is performing VLAN management also performs VTP configuration. If you issue the **vtp domain** command from a storage router that is not performing VTP configuration functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

The VTP domain name applies to all storage routers participating in a cluster. The VTP domain name is a cluster-wide configuration setting. When the VTP domain name is set using the **vtp domain** command and saved to the boot configuration file (via a **save all** or **save system** command), an HA exchange occurs and the VTP domain name will become active on all storage routers in the cluster.

Examples

The following example sets the VTP domain name to *Lab_Network*:

```
[SN5428-2A]# vtp domain Lab_Network
```

Related Commands

Command	Description
restore vlan	Restore VLAN configuration information from the named configuration file.
save all	Save all configuration information, including VLAN information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information, including VLAN information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
show vlan	Display configuration and operational information for the specified VLAN or all VLANs.
show vtp	Display configuration and operational information for VTP.
vlan	Configure a non-VTP VLAN on the storage router.
vtp mode	Configure the storage router to operate in client or transparent VTP mode.

vtp mode

To assign the VTP mode in which the SN 5428-2 Storage Router operates, use the **vtp mode** command.

vtp mode {client | transparent}

Syntax Description

client	The storage router will operate in VTP Client mode. It will exchange VTP packets with an externally attached switch to learn about the VLANs that are accessible in the network. This is the default.
transparent	The storage router will operate in VTP Transparent mode. It will not exchange VTP packets and will only learn about VLANs from explicit storage router configuration via the **vlan** command.

Defaults

Client.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

In a cluster environment, VTP configuration functions are handled by a single storage router. To determine which storage router is performing VTP configuration functions, issue the **show cluster** command. The storage router that is performing VLAN management also performs VTP configuration. If you issue the **vtp mode** command from a storage router that is not performing VTP configuration functions, the CLI displays an informational message with the name of the node that is currently handling those functions. See Chapter 11, "Maintaining and Managing the SN 5428-2 Storage Router," for more information about operating the storage router in a cluster.

VTP operates in either client or transparent mode. In client mode, the storage router exchanges VTP packets with a locally connected switch to learn about the VLANs available in the network. In transparent mode, VTP packets are ignored and VLAN information is pulled directly from the storage router cluster configuration.

When operating as a VTP client, the storage router sends a VTP advertisement when one of the following events occur:

- The Gigabit Ethernet interface on any storage router in the cluster transitions to the *up* state and a valid domain name has either been configured or previously learned.
- The VTP domain name changes.
- A VTP summary advertisement is received with a higher configuration revision.

The switch replies to the storage router with a summary advertisement, followed by one or more subset advertisements.

When operating in transparent mode, the storage router ignores any VTP packets it may receive. VLANs are configured using the GUI or the CLI **vlan** command. Use transparent mode when the storage router is connected to a switched network that does not support VTP but does support 802.1Q VLANs.

Examples

The following example places the storage router in VTP Transparent mode:

```
[SN5428-2A]# vtp mode transparent
```

Related Commands

Command	Description
restore vlan	Restore VLAN configuration information from the named configuration file.
save all	Save all configuration information, including VLAN information.
save scsirouter	Save configuration information for the named SCSI routing instance.
save system	Save selected system configuration information, including VLAN information.
save vlan	Save configuration information for the named VLAN or all VLANs.
scsirouter serverif	Assign a Gigabit Ethernet interface, IP address, and optionally a VLAN to the named SCSI routing instance.
show vlan	Display configuration and operational information for the specified VLAN or all VLANs.
show vtp	Display configuration and operational information for VTP.
vlan	Configure a non-VTP VLAN on the storage router.
vtp domain	Assign a VTP domain name to the storage router.

zone

To create a Fibre Channel (FC) switched fabric zone, use the **zone** command.

zone *name*

Syntax Description

name	The name of the zone created by this command. Enter a maximum of 31 characters. The name must begin with an alpha character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

FC fabric zoning enables you to divide ports and devices of the FC fabric into zones to provide more efficient and secure communication among grouped nodes. Zones are named groups of ports or devices that can communicate with each other. Zone membership can be defined by World Wide Port Name (WWPN), port number or FC address. The storage router supports zone membership defined by WWPN (or alias) only.

Zone members can only communicate with other members in the same zone; however, a port or device can be a member of multiple zones.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including the creation of a new FC zone) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC switched fabric zones.

Examples

The following example creates a zone named *labzone3*:

```
[SN5428-2A]# zone labzone3
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.
zoneset zone	Add a member zone to a zone set.

zone member

To add a device or an alias to a zone, use the **zone member** command.

zone *name* **member {fcalias** *alias-name* **| wwpn** *xxxxxxxxxxxxxxx***}**

Syntax Description

name	The name of the zone to which the member is being added.
fcalias *alias-name*	Make the specified alias a member of the named zone.
wwpn *xxxxxxxxxxxxxxx*	Make the specified WWPN a member of the named zone. **Note** WWPN address notation is represented by 16 hex digits. The digits may be separated by colons. When entering WWPN addresses, colons can be omitted or placed anywhere in the address notation as long as they do not leave one character without a partner character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

Zones are named groups of ports or devices that can communicate with each other. A zone member can be a port or a device associated with a specific WWPN, or an alias. An alias is a named set of ports or devices that are grouped together for convenience. You can add a WWPN or an alias to one or more zones.

Zone members can only communicate with other members in the same zone; however, a port or device can be a member of multiple zones.

Caution If the storage router is connected to the Fibre Channel (FC) switched fabric, all zoning changes (including adding a member to a zone) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, “Configuring Fibre Channel Interfaces,” for more information about fabric zones.

Examples

The following example adds the aliases *testgroup1* and *testgroup2* and the WWPN *220145ab32ca7890* to the zone named *labgroup3*:

```
[SN5428-2A]# zone labzone3 member fcalias testgroup1
[SN5428-2A]# zone labzone3 member fcalias testgroup2
[SN5428-2A]# zone labzone3 member wwpn 2201:45ab:32ca:7890
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.
zoneset zone	Add a member zone to a zone set.

zoneset

To create a Fibre Channel (FC) switched fabric zone set, use the **zoneset** command.

zoneset *name*

Syntax Description

name	The name of the zone set created by this command. Enter a maximum of 31 characters. The name must begin with an alpha character.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A zone set is a named group of fabric zones. A zone can belong to multiple zone sets. The SN 5428-2 Storage Router and each switch in the fabric maintains its own zoning database containing one or more zone sets. When you activate a zone set, zone sets of the same name from all SN 5428-2s and switches in the fabric are compiled and then the merged active zone set is redistributed to every SN 5428-2 and switch in the fabric. This means that all switches and SN 5428-2s in the fabric have identical active zone sets.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including the creation of a new FC switched fabric zone set) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about FC fabric zoning.

Examples

The following example creates a zone set named *foo*:

```
[SN5428-2A]# zoneset foo
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset enable	Activate a zone set.
zoneset zone	Add a member zone to a zone set.

zoneset enable

To activate a zone set, use the **zoneset enable** command. To deactivate a zone set, use the **no** form of this command.

zoneset *name* **enable**

no zoneset *name* **enable**

Syntax Description

name	The name of the zone set being activated.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

The SN 5428-2 Storage Router and each switch in the fabric maintains its own zoning database containing one or more zone sets. You must activate a zone set to apply its zoning definitions to the Fibre Channel (FC) fabric. When you activate a zone set, zone sets of the same name from all SN 5428-2s and switches in the fabric are compiled and then the merged active zone set is redistributed to every SN 5428-2 and switch in the fabric. This means that all switches and SN 5428-2s in the fabric have identical active zone sets.

Only one zone set can be active at a time. You must explicitly deactivate an active zone set to allow another zone set to be activated.

Caution If the storage router is connected to the FC switched fabric, all zoning changes (including activating a zone set) are immediately propagated to other SN 5428-2 Storage Routers and switches in the fabric.

See Chapter 5, “Configuring Fibre Channel Interfaces,” for more information about FC fabric zoning.

Examples

The following example activates the zone set named foo:

```
[SN5428-2A]# zoneset foo enable
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset zone	Add a member zone to a zone set.

zoneset zone

To add a member zone to a zone set, use the **zoneset zone** command.

zoneset *name* **zone** *name*

Syntax Description

name	The name of the zone set to which the member is being added.
zone *name*	The name of the zone.

Defaults

None.

Command Modes

Administrator.

Command History

Release	Modification
3.2.1	This command was introduced.

Usage Guidelines

A zone set is a named group of fabric zones. Zones are named groups of ports or devices that can communicate with each other. Zone members are identified in the storage router by WWPN. A zone can belong to multiple zone sets.

See Chapter 5, "Configuring Fibre Channel Interfaces," for more information about Fibre Channel fabric zoning.

Examples

The following example adds the zone named *labzone3* to the zone set named *foo*:

```
[SN5428-2A]# zoneset foo zone labzone3
```

Related Commands

Command	Description
clear fcswitch	Clear the switch log files of all entries or clear stored zoning configuration information.
delete zone	Delete the specified Fibre Channel zone or the specified member of the zone from the zoning database.
delete zoneset	Delete the specified zone from the zone set or to delete the entire named zone set from the zoning database.
fcalias	Create an alias entity for use in Fibre Channel zoning.
fcalias member	Add the specified member to the named alias.
fcswitch zoning autosave	Enable the SN 5428-2 Storage Router to save zoning changes received from switches in the fabric.
fcswitch zoning default	Select the level of communication between the storage router and devices in the fabric where there is no active zone set.
fcswitch zoning merge	Set zoning merge compliance.
show debug fcswitch	Display internal Fibre Channel interface parameters.
show devices	Display a variety of debug information or perform specific troubleshooting activities for Fibre Channel zones.
show fcalias	Display information about aliases and their members.
show fcswitch	Display global configuration information for storage router FC interfaces.
show fcswitch fabric	Display information about the Fibre Channel fabric.
show zone	Display configuration and operational information for Fibre Channel fabric zones from the local zoning database.
show zoneset	Display configuration and operational information for Fibre Channel fabric zone sets.
zone	Create a Fibre Channel fabric zone.
zone member	Add a device or an alias to a zone.
zoneset	Create a Fibre Channel fabric zone set.
zoneset enable	Activate a zone set.

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